CONQUESTS OF THE SEA

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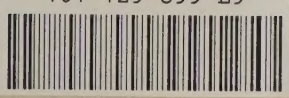

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A FINE OLD SALT

From a study by Emile Fréchon.

Conquests of the Sea

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BY

CYRIL HALL

Author of "Treasures of the Earth"
"Conquests of Engineering"
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Printed in Great Britain by Blackie & Son, Ltd., Glasgow

Prefatory Note

Throughout this book it has been the author's aim to present the story of man's triumphs over the sea in such a manner that the scientific achievements of seamen in modern times shall be seen as complementary to the romantic adventures of old-time seafarers. Just as surely as the giant liner of to-day is related to the Nile boat of six thousand years ago, so are the sailors of our day akin to all those, known and unknown, who have ever adventured on the sea.

But the story is a long one—longer than any man may write—and it is still unfinished.

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CONQUESTS OF THE SEA

CHAPTER I

What the Sea Is

THE Norsemen, the greatest sea-conquerors of history, had a word *blabbra*, a highly expressive word implying much talking of a boastful kind. They were great blabbers, those Norsemen. They blabbed of their fine ships, their fearless sea warriors, their contempt of sea perils; even they went so far as to blab of their conquest of the sea. I think we must have inherited from them something of that blabbing nature, just as we have inherited the word blab itself; a word whose meaning, I must be careful to explain, has changed somewhat during the centuries. For we still blab and boast a good deal of our sea prowess: how the sea is our heritage and our home, and actually, how we rule it! Britannia rules the waves, forsooth! Britannia is a very fine lady, and I bow to none in my respect and admiration for her. But no man, no nation, can rule earth's greatest mystery, the moaning, ever-living flood that engirds her, shrouding her inmost secrets.

Let us blab on, we who do not know the sea, except

from her summer-holiday smile. Let us prate and prattle of sea might and prowess, and roar our sea songs with penetrant, sea-parched lungs, and rouse old Dibdin with a throaty echo. For Tom Bowling *is* a mighty fine fellow, and our sea heritage as magnificent a heritage as need be—so long as we do not inquire too closely what it means: as when God's anger smites the sea, making it roar in agony, and savage to daunt the bravest; as when our pride is humbled by the Great Calamity, and the night-shrouded, silent berg, divinely launched, moves to its inexorable task, to teach us that we may not boast.

This is a book about some of the episodes that led and are leading, slowly but certainly, to the ultimate conquest of the sea. It is not a history book nor yet a physical geography book, though you will find in it a great deal about things that have happened in the past and a little about physical geography and other sciences. I hope you will not mind this, for I have tried my hardest to keep Dr. Dryasdust from putting in his spoke, or, more correctly, his oar. But if you want to read the book aright you must borrow the eyes and the imaginations of your forefathers. You must think of the sea as something vast, sinister, and unknown. You must people it with things ghastly and supernatural. You must believe in the existence of mermaids and ghoulish sirens. You must know vaguely that across the ocean are other shores like the one on which you stand, but inhabited by frightful beings who will certainly kill you and probably eat you, should you put yourself within their reach. How should you not know this? Visitants from these other lands have sometimes appeared in their wicked-look-

ing boats—they have waded through the surf and chased you into your villages, they have murdered your friends and carried off your women. From the sea and the land beyond it come things evil, things to be feared.

Or, as the times grew older and you grew braver, you found the sea less terrible. You found that it was possible to sail upon its waters without being engulfed in whirlpools or destroyed by demons. When you had learnt that you had mastered the first of the great lessons which were to teach you ultimately to master the sea.

It is fortunate for me that I am writing this for British boys to read. If I were writing for boys living in any of the great continental countries I should have to spend quite a lot of time in telling them what the sea looked like—a hopeless task. But there can be very few people left in Great Britain and Ireland to-day who have never seen the sea. Our coasts are so indented that no part of the country is more than a hundred miles from, at least, an arm of the sea, if not the actual coast. It is this fact more than anything else that has made us a maritime nation. We were born with the sound of the sea in our ears and the smell of it in our nostrils. Moreover, we could have no intercourse whatever with other nations without crossing the seas. For many centuries now we have been a nation of shopkeepers, but, in order to send home the goods to our best customers, we have been obliged to build ships and to adventure with them on long and tedious voyages. The only nations whose positions at all approach ours are the Norwegians, Swedes, Danes, Greeks, and Japanese, and

in a lesser degree the Italians. And you must notice that each one of the European nations I have mentioned has had a period of maritime greatness, though the Norsemen were the only people to attain supremacy of the seas. The Phœnicians, who possibly were even greater than we are, occupied a land which was protected on its eastern border by chains of mountains which kept out enemies by land, and also led the Phœnicians to make use of water transport rather than road transport. It must not be forgotten that man is an animal which, in the course of ages, has lost some of its faculties. Man can no longer swim naturally, and therefore when he takes to water he is out of his element. Possibly he would never have taken to water of his own free will, but circumstances forced the necessity upon him. On the other hand, it might have been sheer curiosity and ape-like imitation that set our very remote ancestor to floating a tree-trunk on the Euphrates, and then sitting himself on it to see what the motion felt like. We cannot tell positively about these things, we only know that most of man's developments and inventions have come about of necessity or accident, not of desire. Most of all has this been the case in regard to the ocean. Man was *obliged* to cross the sea. He was *obliged* to build boats that would sail faster and carry more than those of his rivals.

The sea, to the statistical mind, is a vast body of water covering five-sevenths of the earth's surface. It is about 143,259,300 square miles in area, and 323,800,000 cubic miles in bulk. But it is much more than that to mankind at large, whether they know it or not. The ocean was probably the source of all life.

In the beginning of all things this earth of ours was just a whirling mass of incandescent flame, a fragment thrown off from the sun. Gradually it cooled, and the work of creation of a habitable world began; and you know, I hope, where to find a concise and scientifically correct record of this tremendous process. The story in the Book of Genesis gives each one of the great creative periods in exactly the same order as the geologists have recently discovered they occupy. As the flaming gases cooled they adopted different forms. Some solidified and others liquefied, and so in course of time the land and water emerged as we know them now.

Authorities say that the sea was not always salt, but that its various constituents have been washed into it by rivers. At the present period the rivers carry into the ocean 6500 cubic miles of water every year, and this water of course contains great quantities of salts and other earthy matters, either in solution or in solid form. It is supposed that we could find almost every element in solution in sea water, but some matters are present in large quantities. The most noticeable is sodium chloride, or common salt. Sea water has practically the same constituents everywhere, save only that lime is found in a slightly greater proportion in the deeper parts of the ocean. The water is salter in those parts where it is subject to the greatest evaporation, as can be readily understood. The Red Sea and the Mediterranean, both shallow seas exposed to hot suns, are very salt, while those parts of the ocean over which the trade winds blow are also of a saltness above the average. There is great evaporation where the trade winds blow, and

in every other quarter where the vapour is carried away as soon as it is formed.

Not only was the sea the original source of life, but it acts in a wonderful way as a preserver and restorer of health and healthful conditions. One of the reasons of London's splendid health record is found in Father Thames, who, twice in every twenty-four hours, carries down to the sea a vast accumulation of waste products, returning with an equally important volume of water fresh from the ocean. More important still, the sea fills the rain-clouds. It repays with generous interest the 6500 cubic miles which the rivers drain from the land in the course of a year by giving off stupendous volumes of vapour, a large proportion of which is not condensed until it reaches land. The wetness of our western coasts is due to the clouds which roll in from the Atlantic and condense upon the mountain ranges. And here, I think, it will not be out of place to say a few words upon the subject of our coasts.

On the east, as you know, England is in some danger of being washed away. Every year several feet of land are stolen from different parts of the east and south coasts. At Holderness, Lowestoft, Southwold, Cromer, Deal, and Dover, the process is so rapid as to be noticeable and serious; but on the other hand in some places, for instance Sandwich and Rye, the reverse is happening, and towns which formerly were on the extreme shore are now some miles inland. On the opposite coasts of the North Sea, the shores of Friesland and Holland have suffered severely. The Zuyder Zee was formed in the twelfth century, and less than a hundred years later the gulf of Dollart

was eaten out of the dry land. The Netherlanders protect their country now by means of an elaborate arrangement of dykes, but before the adoption of these precautions the loss of life and property from inroads of the sea was enormous. On two separate occasions during the thirteenth century terrible catastrophes occurred, the number of drowned nearly reaching 200,000; while in 1421 a tract of country occupied by seventy-two villages was completely submerged.

It is fortunate for us that the western shores of Great Britain, which have to withstand the heavy Atlantic seas, are provided with rocky ramparts capable of bearing a tremendous amount of assault and battery. Our engineers, too, are continually learning more of the ways of the sea and how to protect the weak places on the coast, so we may hope that some day our little islands will be impregnable. Heligoland, which once was an extensive and fertile little spot, has now dwindled and shrunk so that only the rocky core is left. But nature has a fine idea of justice, and what the sea steals from the land in one place it gives back in another. As a compensation for Heligoland and islands which have been treated similarly, the sea deputes one of its teeming species to build up new islands round a bare rock. The indefatigable coral insect is always at work making new homes for mankind on the most approved plan.

You will say I am wandering from my subject, but as a matter of fact coasts have a tremendous influence on the sea. The water of the ocean is not simply an inert body lying peacefully in a smooth-sided round basin. On the contrary, it is a creature of moods, impulses, and passions, restrained and constrained by

many conflicting influences. In fact, it is such a complex thing to try to explain that I do not quite know where to begin. If we look back to the days when land and sea were first divided, we shall find that they did not occupy exactly the same places on the earth's surface that they do now. From time to time the sea level has risen, or the land level has sunk, with the result that half a continent has been submerged. At the same time, however, reverse movements have caused the uplifting of a new continent somewhere else. Thus, in the Lower Cambrian period, North America was represented by a separate mass of land including Greenland, and extending farther north but not so far west as does the North America we know; while in the Silurian period the mass has disappeared, only a few isolated islands remaining to show where it once existed. In the Ordovician times there were only two main continents, and a great part of Asia lay under the sea. We cannot say definitely that such forces are not still active. The geological periods are so vast that the few years during which we have had the benefit of accurate maps are no more than a second in comparison. The uplifting of a continent would be so gradual as to be hardly perceptible. One thing is certain, that mysterious influences other than tides, winds, and currents operate on the sea.

First, then, let us consider the tides, as being a quality of the sea with which everyone is familiar, and but few persons understand. It is quite easy to say, "Oh, the tides are caused by the moon", but it is by no means easy to explain why or how the moon, many thousands of miles away, makes sea-water struggle a certain distance inland and then fall back

"THE ROCK-BEATING SURF" (*Byron*)

A fine study of waves by Mr. Worsley-Benison, who has made a speciality of this kind of work.

C 766 From *The Depths of the Ocean*, by kind permission of Messrs. Macmillan & Co.

ON THE *MICHAEL SARS*: HAULING IN A LONG LINE BY MEANS OF A LINE WINCH

The ocean's mysteries are probed slowly and with infinite pains by scientific expeditions like those of the *Challenger* and the *Michael Sars* which made her memorable voyage in 1910. The latter ship brought up a trawl full of deep-sea wonders from a depth of nearly 3¼ miles. The trawl took more than six hours to haul in.

again. It can be done, however, by the help of that most useful law of gravity without which the world would be such a curious place. As a matter of fact, the sun has nearly as much to do with the matter as the moon. Imagine three dogs tied together, three dogs of different sizes, one being very much bigger than the other two: they will pull and tug at the chain which holds them, but the poor little fellow in the middle will be at the mercy of the two outside him. The position of the middle one is similar to that occupied by the earth. The sun, who is, of course, the largest dog, holds his own in the tugging contest and forces the next one to follow him. The middle-sized dog, the earth, is dragged after the sun, but perforce pulls the smallest dog, the moon, with him. The smallest dog, however, still has some spirit left in him, and though he cannot free himself he can harass his bully by pulling and straining and giving all the trouble he can. To drop the metaphor, a feeble one at best, the earth follows the sun willy-nilly, but the moon, reluctant to follow the earth, hangs back. Her power is of little effect on the solid crust of the land, but the volatile sea rushes to meet its queen.

Now, once a month the sun and the moon are both at the zenith at the same time, at the period we call new moon. At the time of new moon the sun and the moon are at their highest point exactly at the same moment, and the sea, hurrying to meet them, produces a spring-tide. At full moon the moon is at its highest point on one side of the earth while the sun is at its zenith at the other, and a spring-tide occurs on the moon side of the earth. But when the sun is at right angles to the moon, as at new half-moon and old half-

moon, the stronger pull of the sun overcomes the attraction of the moon, and we have tides of much smaller proportions, which we call neap-tides. You must remember that these rules apply all the world over, and that a tide on one side of the earth is always accompanied by a similar tide on the other. The reason for this may seem obscure at first, but it becomes more simple when you reflect that if the moon pulls the water towards her on one side of the earth, the water on the other is not affected, and is therefore left behind. Try to think of the world as a sphere of land enveloped in a sheet of water. Sun and moon pulling simultaneously draw the water towards them, making a spring-tide on the near side of the world. But they also draw the solid core to a certain extent. So the water on the far side, unaffected by the moon's attraction, is high on that side as well.

This, then, on paper, is the time-table of the tides. Spring-tide at new and full moons, neap-tide at new half-moon and old half-moon, high tide daily when the moon is at the zenith. You know very well, however, that these rules do not meet the case at all, while the difference in the height of the tide at different points is enormous. You have noticed, no doubt, when you have been spending a holiday at the seaside, the height to which the tide rises. In some places it is only a few feet, while in others the sea rolls up for hundreds of yards, and the shore at high tide is quite a different place from the shore at low tide. These variations are due solely to the formation of the coast. The tide, which if unrestrained would be as universal in its movements as the sun himself, is by the exigencies of the coast-line

turned into a purely local factor, having its peculiar times and heights for every place it visits. It has only two playgrounds, the Pacific and the Southern Ocean. In these vast seas the tide can ebb and flow, rise and fall, entirely at its own sweet will. There is nothing to hamper it, nothing to interfere. It can rise up to meet its goddess, and fall back again exhausted when she has passed. But as soon as it reaches the land, that phlegmatic, unresponsive land that frowns so sourly on the fancies of its next-of-kin, it finds its energies checked. Instead of rushing gaily along it has to twist and turn, to find its way among rocks and over sandbanks, now fast, now slow, now to creep, now to rush and roar and pile itself up 30, 40, or 50 feet. By the time the tide reaches the English Channel it is already somewhat tamed by its long struggle through the inferior spaces of the Atlantic. The indentations of our coasts cause it to behave very queerly. In the Severn Estuary it forms a bore, a rushing wall of water sometimes five or six feet in height; while behind the Isle of Wight it behaves contrary to all expectations, for it rises four times in twenty-four hours instead of twice. Obviously we cannot hold Madam Luna responsible for this, for she naturally does not devote more of her attention to the Solent than to any other body of water. The phenomenon is due to the presence of the island. The tide, travelling up the Channel, runs up the Solent as a natural duty, but when it gets round the island and finds another opening on the other side it feels bound to fill that up too. Thus Portsmouth and Southampton have four high tides. The case of Bournemouth, from the same cause, is even more

complicated. The tide rises and then falls slightly, suddenly changing its mind and rising again, making a second high tide three hours after the first. Then it ebbs and goes right out for six hours.

As it is most important that the tides should be understood by all seamen, elaborate tide tables are prepared for their use. High water always occurs at the same time on the days of the full and new moons. This time, whatever it is, is called the *establishment of port*, and as the tide flows at a regular pace, the establishment at various ports round our coasts is consecutive.

The currents of the ocean constitute another of the mariner's problems, and a very serious one too. They arise from multifarious causes, the configuration of the coast being in a large measure responsible for currents near the shore. The old saying that "still waters run deep" does not always apply in the case of the sea. Upstanding rocks or a sudden rise of the sea floor will create a current. The race caused by a reef running out to sea is often very dangerous to small boats. Such currents, however, are purely local affairs, and though they may be important to the bathing public they are of no use to the world at large. The currents which make themselves felt and heeded are not connected with any such promiscuous matters as shallow bays and outcropping of rocks. The circulation of sea water as a matter of fact takes place in much the same way as the circulation of air. Cold water is heavier than hot water, just as cold air is heavier than hot air. In the sea, as in the air, cold currents are continually pouring from the polar regions towards the equator to take the

place of water lost by evaporation. These travel along the bottom of the sea, while warm currents move along the surface from the equator towards the poles. In this way the waters are constantly changing and circling round the continents, and anything like stagnation is effectually prevented. The variation in temperature of the sea is, however, surprisingly small. Deep-sea water is always cold, water at a depth of 300 to 400 fathoms having a temperature of somewhere about 40° F. all the world over in unenclosed seas. Land-locked seas which are not visited by the cold polar currents have warmer depths. The summer and winter surface temperatures as a rule differ only by from 5° to 10° F., while the fall of temperature at night is often less than 10° F. We can imagine that the heat of the sun could really have but little effect on such a vast body of moving water. It is in enclosed or partially enclosed seas that the water gets hot.

So far so good, but just as something more than a mere up-and-down motion is required to keep the atmosphere sweet, so the waters of the sea do not depend simply upon the tides and the natural circulation I have just described for their motive power. The most vigorous impulse of all comes from the upper world, and is, of course, produced by the wind. The wind is such a common thing to us that we do not give it anything like the consideration it deserves. Let us stop to think for a minute of the journey taken by that gust which blew just now, for instance, ruffling my papers and scattering dozens of notes which I mean to bring into this chapter somehow. He was a rough, boisterous fellow, and I suspect him of having spent so long sporting in the Atlantic that he

has forgotten entirely the manners of the civilized world. Such a way to enter a room! Bursting in through the window, banging up against things and knocking them down, rattling the pictures, blowing across my neck so that if it is not stiff to-morrow I shall be very much surprised, and then flying out of the door and down the stairs, through the hall and away over the garden, losing himself among the poplar leaves, which shake and tinkle with laughter at the stories he tells.

He is an old friend of mine, this roaring sou'-wester, as he is of all who have lived much in the west country, and always he speaks to me of the sea. He cannot remember much of his early days. Dimly he hints at great white shapes, which cannot but have been icebergs, but whither they were bound and whence they came he does not know. He likes best to tell me of the sunny South Atlantic, the days when he floated lazily up the African coast, till suddenly he felt the call of the west and turned his head boldly in the direction of Trinidad. Then more lazy days when the Caribbean Sea basked in the sunshine, and its warmed waters passed slowly into the Gulf of Mexico. The jewel-like islands of the West Indies offered him all their delights; he floated down the orange groves, rustled the coffee bushes, inhaled a thousand perfumes. So he idled away the time, until one night he arose and spread his wings. Northward and eastward he flew, leaving mile after mile of dark water behind, gaining strength and courage in his flight. Day broke and found him far from land, and when night fell he still was beating his way through the silent spaces. Weeks passed.

It was a great journey, wind and water hurrying together, laughing, leaping, swooping, teasing the ships they met, and good-naturedly helping those they overtook. At length, one bright morning, the shores of ancient Lyonesse loomed up before them, rocky and forbidding. Onwards, onwards, brothers! now is not the time to retreat. Beat upon them, crush them, tear them down—— Dear me, I am afraid I have been dreaming!

Really, I beg your pardon. What I meant to tell you was that the winds which blow over the oceans follow certain well-defined courses with great constancy, and it is on this account more than on any other that we find currents flowing through the open sea with such regularity that they can be measured and charted and counted upon. Thus in the Atlantic Ocean, beginning at the south and working northwards, we find the Cape Horn Current sweeping round the extremity of South America, and dividing into two portions at about the latitude of the Falkland Islands. One portion turns inland, the other and larger portion striking out towards the Cape of Good Hope. Here it joins in with the South African Current, which merges successively into the South Equatorial Current, the Brazil Current, and the South Connecting Current, describing a huge circle between the two continents. The South Equatorial Current sends an offshoot northwards as the Main Equatorial Current, which, with the Guinea Current, forms a second circle. The Guiana Current, on the west, leads this second series into the Caribbean Sea, and thence into the Gulf of Mexico, from which it issues as the most famous and important current of the world—the Gulf Stream.

If you look at a map of North America you will realize how nearly surrounded by land is the Gulf of Mexico. The great peninsula of Yucatan, then the Island of Cuba, then Florida, seem united in a futile attempt to turn the gulf into an inland sea. The water, already warmed from its long voyage through the Tropics, enters the gulf, which for the most part is shallow, by way of the Yucatan channel. It circles completely round the coasts, and then makes for the open sea again through the Straits of Florida. The trade-winds are responsible for driving the water into the gulf, and so thoroughly do they do their work that the water literally is piled up on the shores of Mexico and the southern United States. As the stream passes through the Straits of Florida it has a width of 50 miles, which quickly broadens when it reaches the open sea. Off Sandy Hook it is 300 miles wide. As it widens it loses speed, until, a little to the north of Newfoundland, it adopts the Atlantic north-easterly progression of 4 to 5 miles a day. At this point it spreads out and divides, one branch going northwards into Baffin Bay, a second flowing up between the British Isles and Iceland, while yet a third bends across the Atlantic, taking the name of North African Current, and ultimately joins the Guinea Current. The warm, blue waters of the Gulf Stream may be detected flowing quite separately from the dark-green of the Atlantic. In fact, it constitutes one of the wonders of the world. To it we owe the mildness of our climate. Berlin, which lies in the same latitude as London, has a very rigorous winter, while without the influence of the Gulf Stream Norway would be uninhabitable. The inhospitable

climate of Greenland is due less to its high latitude than to the icy current which circles its eastern shores, flowing directly from the Polar Sea. Baffin Land and Labrador are chilled in the same way by the Labrador Current.

Perhaps the most remarkable feature of the Atlantic Ocean is the Sargasso Sea. This huge area of water, undisturbed by any of the great ocean currents, is the collecting point for billions of tons of drifting sea-weed, the gulf-weed or *Sargassum*. The accumulation of this weed is sometimes so great that ships have a difficulty in cutting through. We can imagine that the followers of Columbus looked fearfully at the advancing lines of long yellow weed. It would be enough to depress the boldest when those lines closed up round the ships, completely stopping their progress. What sinister origin must they not have ascribed to them! Picture them calling upon the Saints and the Virgin for aid; and giving thanks for their deliverance when, by perfectly natural laws, the weeds passed by, and they found themselves once more able to make way.

The Pacific Ocean also displays well-marked currents, caused by the trade-winds and the monsoons. The two trade-winds blow from the north-east and the south-west with great constancy, between the zones of which is found, in the eastern Pacific north of the Equator, the equatorial belt of calms. In the western Pacific the region of calm is found during the summer only and south of the Equator. Calms are found to the north and south of the trade-winds also. The monsoons change their direction with the season. The Pacific has scarcely any communication with the

Arctic Ocean, but cold currents pour into it from the Antarctic. The most important is the Equatorial Current, which, under the name of Kuro Siwo, flows northwards past the coasts of Japan, warming them as the Gulf Stream warms us. The Kuro Siwo is not so constant in its flow or its temperature as the Gulf Stream, but it is more peculiar in that, during the north-east monsoon, it runs side by side with a cold current coming southwards from the Yellow Sea.

To all of us, probably, the most wonderful thing about the sea is its motion. The spectacle of wave following wave in unbroken regularity is one which never tires and never explains itself. We may say that we know how they are caused, but we never cease to wonder at them. Very frequently they are caused by wind. If you blow along a slackly stretched table-cloth or sheet you will make waves, just as the wind makes waves along the surface of water. The sheet itself does not move, and neither does the water; the surface only heaves up and down. The heaving motion of the water, moreover, extends apparently to an unlimited extent over the surface. We may feel no wind where we stand on the shore, but we may see breakers crashing in quite furiously. Then we know that far out at sea the wind is blowing and beating up the water. The motion is passed on from wave to wave, until finally it is hurled upon the shore. But even then it is not finished. We know that energy is never lost. Some of the energy of the broken wave is absorbed—not exhausted, mind—in the rock on which it fell, while some is drawn back to meet and do battle with the next wave. Of course gravity has a part to play in the making and breaking of

waves. How, indeed, should we get on at all without gravity? Movements of the submarine earth may also account for them, though great sea waves caused by earth waves are usually of a terrific and devastating nature.

We will content ourselves, I think, with the study of just ordinary wind-driven waves, about which I might write whole volumes if I thought it likely that anyone would buy them. For waves present an inexhaustible study, just as they are an inexhaustible wonder. No one really understands them, sailors, perhaps, least of all, though they know that certain waves will do certain things. They know that every third wave is bigger than its two predecessors, and that every ninth or tenth is the biggest of all the series, but why, "nor they nor nobody knows".

The waves, then, driven on shore by the action of the wind, and forced to break by the laws of gravity, have a manifold duty to perform. They have to help in the construction of beaches by casting up drift and shingle, and in the destruction of rocks and cliffs by thundering upon them. We are accustomed to think of the waves as the most deadly of Nature's artillery, but that is really quite a mistaken view. The raindrops, falling upon the same rock for hours at a time half the days in the year, the sharp particles of sand and dust borne upon the wind, are more effective carving tools than waves. As a matter of fact the mere weight of water of a breaking wave, heavy though it may be, is not in itself of much effect. Less damage is done by the water than by the highly compressed air which the descending wave drives before it. But to return to our subject. The waves

breaking upon the shore raise and maintain the beaches, but a little farther out the reverse process occurs and loose matter is carried out to sea. In this way circling our coasts at a varying distance there is a neutral line. Above this line sediment is carried on shore; below, it is carried away from shore. This principle becomes very important when a new harbour is to be built, and the position of the neutral line has to be considered most carefully. Many ports and basins have in course of time silted up on account of their being above the neutral line, while outside those that are below the neutral line the water continually deepens.

Naturally, since waves play such an important part in the drama of the world, they are being studied and observed constantly by scientific men. Not only do they affect our coasts by inundating them or receding from them. They might injure our commerce by throwing down our sea walls and destroying our harbours; they do injure it by delaying our ships, and annually they account for the lives of large numbers of our countrymen. Shipbuilders work side by side with the students of waves. No boat is built to a new design without reference to the *wave system* propounded many years ago by Scott-Russell. The results of the work of the wave students are most valuable, but they do not yet know all there is to know on the subject. Told briefly and simply, the height of waves depends upon the force which has produced them. The stronger the wind the higher the waves, and if the wind blows hard from one direction continuously the waves will grow in size. We get the largest waves when a gale has

lasted for several days. Salt water produces higher waves than fresh. The area and depth of a sea, too, have a great bearing upon the waves raised upon it.

But though we read of waves "mountain-high", the highest recorded wave of which we can believe the record to be true is under 60 feet. The maximum heights vary in different seas. Round about the British Isles 20 feet is a great height for a wave, 13 feet is the maximum for the Mediterranean and the North Sea, while the average for the Atlantic on a voyage from Boston to Liverpool is said to be 19 feet. The Atlantic can, of course, do great things in the way of waves, and in anything like a storm they may exceed 40 feet. Sir James Ross records one of 36 feet off the Cape of Good Hope; while 39 feet is the highest trustworthy wave of the Bay of Biscay. When a storm occurs far out at sea the waves may spread out in the long rolling lines which we call a ground swell. These break when they reach shallow water. There comes a point in the history of every wave when it *must* break. This point is determined by the height of the wave and the depth of the water. Roughly speaking, a wave is fifteen times as long as it is high, while its influence is felt under the sea for a distance equal to three hundred and fifty times its height above the sea, *in theory*. In reality, it is believed that waves rarely make themselves felt below 300 feet, while at a certain depth—600 feet according to some authorities—there is constant calm. And that brings us to the consideration of a most fascinating subject: the depths of the sea.

Jules Verne was a wonderful man. Many of the things which he foresaw have been achieved, and

possibly his most successful imaginative feat was that embodied in *Twenty Thousand Leagues under the Sea*. Much more is known to-day of the actual submarine conditions than was even dreamed of by Jules Verne, largely through the efforts of the various deep-sea expeditions. Captain Nemo took his prisoners for walks along the floor of the sea. We know now quite well what the sea-bed looks like, and we are struck, when we walk along the bottom of the Atlantic, for instance, by the monotony of the scene. Mile after mile stretches away round us, unrelieved by any but the most moderate changes in the level. Gentle descents and ascents we may meet, but so gentle are they all that a motor run from Ireland to Newfoundland would be the simplest thing in the world. The Atlantic is not the deepest ocean, but neither is it a shallow one. A little to the north of Porto Rico soundings of 27,000 feet have been obtained, and this is believed to be its greatest depth. On the other hand, a raised plateau known as the Dolphin Ridge, above which the water is never deeper than 12,000 feet, occupies a position towards the east of the ocean, dividing it into two basins. From this ridge spring eminences which we call Iceland, the Faroe Isles, the Shetlands, the Azores, Ascension, and Tristan d'Acunha.

The Pacific has an average depth of 14,000 feet, but in many places narrow depressions or trenches sink twice as far, while one sounding, south of the Friendly Isles, evidenced an abyss 31,000 feet deep. The trenches which have been detected in various parts, often 1000 feet lower than the adjacent bed, are believed to be the work of ancient rivers that have

been engulfed by the sea. Where mountains occur, they rise so abruptly as to make the climbing of them a feat for the hardiest members of the Alpine Club only.

As may be supposed, the work of examining the ocean bed requires great skill, patience, and the most delicate and elaborate instruments. "Heaving the lead" is such a common part of the sailor's duty that we are apt to underrate its difficulty. But try to take soundings in a part of the ocean several miles deep and you find a task calculated to require all your energies. The oceanographer of to-day, however, does far more than merely find the depths of the sea. He can take its temperature at any given depth, or bring up samples of water for analysis, find out the nature of the bottom, catch fish and marine organisms that live thousands of feet below the surface. Research of this kind, begun so splendidly by the *Challenger*, the *Michael Sars*, and other expeditions, forms one of the objects of every Antarctic voyage. The simplest kind of lead, which forms part of the mariner's stock-in-trade, is a heavy piece of lead attached to a hempen rope, marked off into fathoms by threads of different colours. The bottom of the lead being smeared with tallow, specimens of the sea-bottom adhere to it. An improvement on this primitive tool is a lead having a valved receptacle for bottom samples. Sounding the deep seas is a comparatively modern accomplishment, for with the old leads there was no certainty that bottom had been reached. Now, however, by an invention of an officer in the United States Navy, the weight detaches itself when it touches the bottom, while the specimen tube

remains on the line. The *Challenger* used a line weighted by 3 or 4 cwt. of iron sinkers. Directly these touched, the speed at which the line was running out slackened, the sinkers detached, and the line with its load of thermometers, water bottles, sample tubes, and other paraphernalia, was quickly hauled up. On occasions when the line carries a weight only, and depth is the only thing which is to be ascertained, the twine is cut away directly the weight touches, and no time or labour is expended in drawing in the line. By means of various devices it is possible for a ship to sound while under way. One of these is the "submarine sentry", a kind of kite which is trawled behind the ship, and registers the depth in the chart-room directly it touches bottom; while another is a glass tube coated with a chemical preparation which has its colour changed by the pressure of the sea at different depths.

What is the stuff, then, that is brought up from the hidden regions of the sea: and why does anyone spend his time fishing for it and inventing instruments for the purpose? The geologist, the geographer, and the biologist will answer those questions for you. The sea-floor is made up partly of the dust which the winds carry from the land and partly by the sediment brought down by rivers. By far the greater part of the sea-bed, however, is covered with "ooze", that is to say, the remains of countless numbers of sea creatures. The oozes are divided according to the class of creature which composes them. Thus, "Pteropod Ooze", which is found on raised portions of the floor of tropical seas and never at a depth greater than 1000 fathoms, has been formed by the shells of

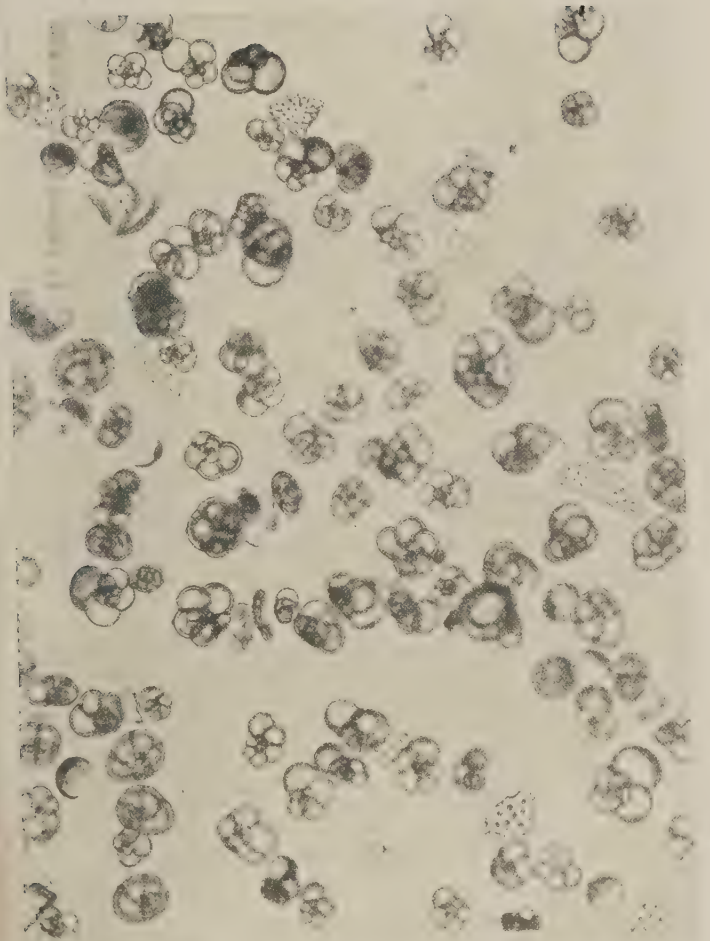

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Photo.-Micrograph, Messrs. W. Watson & Sons, Ltd.

THE MARVEL OF LIFE IN THE DEPTHS

The minute animals shown here, highly magnified, were brought out of the Atlantic from a depth of 2 miles. They are mostly Foraminiferæ, whose beautiful shells have made great areas of the dry land.

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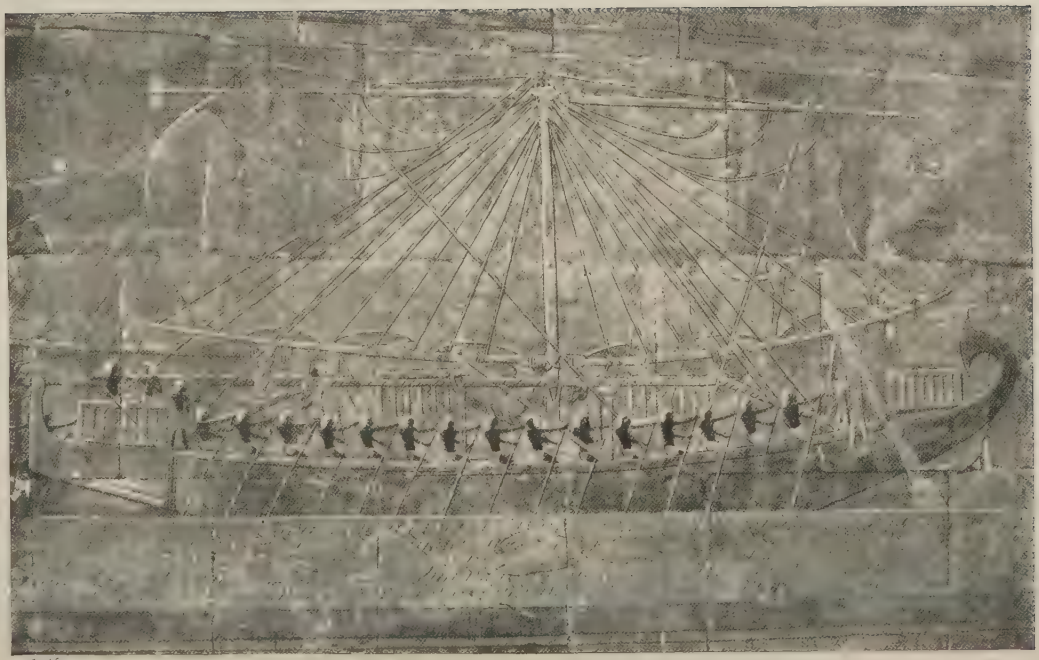

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QUEEN HATASU AND THE LAND OF PUNT

pteropods and gasteropods; "Globigerina Ooze", the substance which covers 47,752,500 square miles of the ocean floor with a blanket well over 3000 feet thick, is the "chalky ooze". The "white walls of Old England", the downs of Kent and Surrey, the Chiltern Hills, are all visible evidences of the accumulative power of the globigerine. Yet the shells of these organisms are so small that ten thousand of them would barely cover a square inch. If, some day, the level of the Atlantic sinks, we shall have new islands surrounded by "white walls" and new chalky downs on which to pasture sheep and grow mushrooms. "Diatom Ooze" is found chiefly in the Antarctic. It makes a wide ring round the southern hemisphere, and covers 10,000,000 square miles of ocean bed, but the diatoms when alive were only microscopic plants, having a sort of skeleton of silica. "Radiolarian Ooze" is also siliceous, but in this case the silica was derived from the shells of microscopic animals.

Red clay is classed among the oozes, but the recognizable organic remains contained in it are almost entirely confined to two kinds: namely, the teeth of a kind of shark which has been extinct for innumerable years, and the earbones of whales. That red clay is deposited very, very slowly is proved by the fact that these remains of long-dead sharks and whales have not been hidden far below the reach of man, though he be armed with the most uncannily efficient of tools. It covers, however, more of the sea-bed than any other deposit. Besides the oozes, we must mention the muds: blue mud, red mud, green mud and sand, volcanic mud and sand, and coral mud

and sand. Round the coasts, in the shallow waters, the sea-floor is mostly composed of "land detritus", that is to say, the sediment resulting from the wear and fret of the waves on the beach, the product of rivers, and so forth. The muds and oozes are found underlying the lowest depths of the ocean.

So far our knowledge of the creatures which inhabit these abysmal waters is rudimentary. In the words of a jolly jack-tar who helped in the trawling operations on board the *Bacchante*: "Them there deep-sea fishes is constructed with the pressure hinside to withstand the pressure houtside. As you pulls 'em up the pressure hinside increases and the pressure houtside decreases until when they comes out o' the water they goes and busteses their silly selves." We shall have to study this branch of zoology with the help of the submarine, but even that marvellous invention will have to be revised before it can descend with safety 25,000 or 30,000 feet below the surface. After all, how little we know! We may describe the ocean as a body of pale-blue salt water which encompasses the continents, we may call it the highway of the world, the source of our fish supply, the cradle of the winds, any name we like, in fact, but our knowledge is not advanced by one jot. The depths of the ocean, like the peaks of the Himalayas, still are free from the inquisitive eyes of man. But the day of their discovery is not far distant.

CHAPTER II

The Beginning of Ships and Shipping

I LIKE this chapter heading. You, possibly, have not yet taken the trouble to look at it, so the fact that it promises a great deal more than it can perform will leave you quite cold and free from indignation. I do not suppose anyone (except the publishers) would care a snap if I made the heading "Shoes and Ships and Sealing Wax"; and, candidly, that would be almost as sensible as the one I have chosen. We cannot find the beginning of ships. However crazy and primitive may be the earliest boat we can find, we can be sure that it was preceded by one still more crazy and primitive. The history of shipbuilding, moreover, is bound up closely with the history of nations. We cannot understand the one without understanding something of the other, for navigators, like poets, must be born to the business. We can hardly define the spark which fires the navigator—he who leaves home and friends to adventure himself upon the high seas in a ridiculous boat in quest of the unknown. It is something more than venturesomeness, and decidedly something better than curiosity.

The Egyptians furnish us with the first evidences of water traffic; as indeed they do of almost every art or science which has ever been practised. Now, we

divide ancient Egyptian history into "civilizations", and in the period known as the first civilization, that is to say, a space of time not more recent than 7000 B.C., nor yet more remote than 8000 B.C., the Egyptians became proficient in the use of the canoe. Authorities tell us that in these early days the Egyptians lived a life very similar to that of the Maoris, who, as you know, are wonderfully expert with the canoe and paddle. In the second civilization the Egyptians made a great advance, for they began to build large ships for trading. These boats were from 60 to 100 feet long, and were propelled by numbers of oarsmen. In some pictures as many as sixty oars to a side are shown.

Egyptian commerce, however, received its greatest fillip during the reign of Queen Hatasu or Hatshepsut (1503–1451 B.C.)—called, we may hope, Hats, for short. This masterful lady had many idiosyncrasies; she adopted male attire and a false beard: and she has left behind her a record that is far from blameless. She is believed to have murdered her brother, Thomes II, and was as utterly unscrupulous in the means she used to obtain her ends as are the most advanced of the suffragist ladies to-day. But, for all her vanities and faults, she encouraged shipbuilding and trade with distant countries, with excellent and far-reaching results. The most memorable of her ventures was the expedition to Punt. The land of Punt has been identified with southern Arabia, and in the time of Queen Hatasu was occupied by a simple people, ruled over by a king whose wife was a most extraordinary little dwarf. She is pictured as having a little face, a large body and long arms, and

tremendous hips ending in very short legs. However, she and her husband received the Egyptian sailors with much friendliness, and a harmonious trade was established between the two countries. Of course the Egyptians, being sensible people, had come properly equipped with gifts for the natives of Punt; in return for which they accepted timber and resin, gold, silver, ivory, ebony, cassia, and leopard skins, as well as such live stock as slaves, dogs, and baboons. When the expedition returned to Thebes, the queer little queen and her retinue went with it, on a visit to Hatasu. Worthy "Hats"! It was no small conquest of the sea that was achieved by a half-crazy queen of Egypt more than three thousand years ago!

Now let us cross the Mediterranean to learn something of those wonderful men who may properly be called the Fathers of Navigation. The name Phœnicia was given to the narrow strip of land north of Palestine by Greek traders on account of the groves of palm trees that flourished there—Phœnicé meaning palm land. It was a beautiful country. The sea-coast, gently indented, afforded numerous natural harbours, round which the palm trees grew. In the plains beyond were cornfields, and orange groves famous for the size of their fruit. There, too, grew the olive, the pomegranate, the vine, and the mulberry. And on the lower slopes of the protecting mountains were lordly forest trees—oaks, chestnuts, sycamores, terebinth, and, best of all, cedars. Here, close at hand, were limitless supplies of timber for the building of ships, and for the making of all kinds of furniture and decorations.

One is bound to wonder why, when their own land

was so well favoured, did the Phœnicians want to roam? We shall not find the whole answer in two or three words. To begin with, the Phœnicians were excellent workmen. They practised every craft known to the world at that stage—pottery, glass-making, weaving, gold- and silver-smiths' work, and, above all, dyeing. They made their wonderful crimson and purple dyes from two species of shell-fish which swarmed in the calm, tideless waters of the Mediterranean, particularly off the coast between Mount Carmel and Tyre. We read in the Old Testament of the high esteem in which products and workmen from Tyre and Sidon were held. Ships and sailors were generally necessary for the conveyance of these products, for though the mountains made invasion of Phœnicia difficult, they made trading excursions equally difficult. From about 1200 B.C. onwards the Phœnicians had control of the carrying trade of the whole world. They could send caravans by land to the Persian Gulf and the Euphrates, to Armenia, Cappadocia, and Anatolia; while their ships sailed the seas to Egypt, Greece, Italy, the north of Africa, Spain, and Gaul. Hand in hand with their commercial instinct went one more important in the case of the Phœnicians. It is not so in every case, for it is a quality in which the greatest traders of to-day are almost wholly deficient; I mean the mysterious quality which we call the colonizing instinct. Wherever the Phœnicians went they left a marked impression, an impression that was, naturally, more distinctly to be seen in people of a lower state of culture than themselves. They found a people in a likely district in a primitive state, and after trading, would proceed to

educate them. If it was worth while they would establish a factory on the spot, and round it would grow a trading station. Such was the origin of Utica, on the northern coast of Africa, and of Gades, which we call Cadiz. Carthage, and Marseilles, too, were founded by Phœnician traders, though the greatness of Marseilles was due more to Greek influence.

The success of the Phœnicians in founding colonies was due to four distinct characteristics. First and foremost we may put a desire for wealth and ease. To make money and retire from business, wealthy and care-free, was the ambition of most of them. But coupled with this was a capacity for unlimited hard work, accompanied by great steadfastness of purpose. Moreover, they were extremely adaptable by nature, and could bend themselves to the roughest circumstances in order to gain their ends. Lastly—I wish I could have put it first—came their love of their religion. They always built temples in their colonies and converted the natives to the worship of their gods; but in the course of centuries their religion became very much degraded, until at last it merely served as a cloak for excesses of the worst kind.

They were great people, these fathers of shipping. Without a doubt the Phœnicians had brains of a very high order. The alphabet which we and all other western nations now use was invented, or at any rate revised and standardized, by them. They made a fixed scheme of weights and measures, which they introduced into all the countries they visited. They were the first people to steer by the Pole star. They discovered and opened up remote regions of Europe, Asia, and Africa which had never previously been

visited by the ruling nations. Besides these exploits they found time to study practical sciences. For instance, when they were building the port of Aradus they found that fresh water, other than rain water, was not to be had. There were no rivers nor springs anywhere in the neighbourhood, except one little jet of fresh water spouting from a submarine spring in the middle of the channel separating the port from the island. Do you suppose this bothered them? Of course not. They determined to use this spring, so an apparatus was devised consisting of a heavy lead cap fitted to a long leather tube. The cap was fixed down over the spring so as to exclude the sea, and the fresh water was pumped up through the tube to a boat moored in the channel.

All the Phœnician ports and cities are admitted to have been masterpieces of town-planning and fortification; but it must be recognized that their talents were all of a practical nature. They have left no literature and no paintings, but they gave the world a greater legacy by establishing commerce on an honest basis. They made or sold nothing that was not the best of its kind; and if, as Herodotus tells us, they once seized and carried off Io, the daughter of King Inachus, and her maidens, for the sake of the gold they wore, the occurrence is practically the only blot on a career lasting for more than a thousand years. Modern sages, however, say that the story is purely allegorical, Io standing for the moon, and her wanderings for the movements of Madam Luna through the heavens.

I suppose the Phœnicians felt the call of the sea more than any other nation has ever done, with the

possible exception of the Northmen. Whatever it was that set them afloat—and peoples before them and after them—hope of wealth or fadeless glory, or the love of going forth, the real intense passion for seeking adventure that still moves men from time to time—whatever it was, it was very wonderful and quite indefinable. Shut your eyes and think of it. Imagine yourself a passenger on a Phœnician *gaulos*. Your ship is a cross between a cradle and a butter-tub. She rolls like a Dutch eel-boat: to be half full of water is her normal state, to be waterlogged a not uncommon one; for she is caulked with bitumen, or perhaps with a sort of putty made of smashed-up shells and oil. She cannot steer, our poor *gaulos*; not knowing her stem from her stern very obviously she cannot answer either, except by the inexactitude of chance; so she goes to leeward, to leeward all the time. She strains at every heave of the oars, opening her seams still wider—to her crew, a very frank invitation to sup with Davy Jones, or whatever his Phœnician prototype was called, if he had one. And our *gaulos* will hug the shore, partly because she would soon lose herself if she did not, and also, probably, because her mariners, fearless enough of most sea perils, cannot yet overcome their dread of the unknown sea. So our argosy hugs the shore, and a kindly rock soon puts us out of our several miseries by tearing our bottom from under us. Or, if you prefer, we are blown to sea, shortly to founder in a Mediterranean squall. Release comes often enough to the poor wretches slaving at the leaden oars; with squall and pirate, jagged rock and deadly lee shore, their servitude cannot be long, save by a miracle.

You think I am drawing the long bow, no doubt; the Mediterranean is always calm and sunny, and beautifully blue—do not the posters tell us so?—and my perils must be over-coloured. But surely you have heard of the Levanter, swift, unheralded, certain in destruction? Not at all a nice thing to face in a seaworthy craft, and deadly still to the small fry of the Mediterranean. The Phœnicians had, it is true, boats larger and more seaworthy than our *gaulos*, but an enormous proportion of their *long ships* and their *biremes* must have found the Port of Missing Ships. You may remember that when the Persians tried to invade Greece they were defeated by a storm off Mount Athos, which destroyed 300 of their ships, while on their second attempt they lost 600 ships.

There is a gap of a thousand years between the hey-day of the Phœnicians and the rise of the next race of southern navigators. The shipping of the Greeks was mostly concerned with war and did little in the way of exploration. The Romans learnt whatever they knew of shipbuilding from the Greeks, but, as you know, for the most part the Romans at sea were very much at sea. It was not until the fifteenth century that the Spaniards and Portuguese—see how civilization spreads westwards!—began to attract attention as maritime peoples. In the meantime, however, a great nation had waxed and waned in the north, one which had more influence on our own country than the Phœnicians, for its people not only visited us, but also occupied the country and became a part of the British nation. It is a difficult matter to give this people a name. The old chroniclers were not very accurate persons, and though they join in

magnifying the bold and warlike character of the northern tribes which harried the coasts of all the known seas, they do not agree as to the home of these warriors. They call them variously Franks, Vendi, Saxons, Danes, and Northmen, while some of the Roman historians give them the name of Sueones.

I think we had better call them Northmen, which is a safe appellation, as they certainly came from the north. Tacitus speaks very highly of the fighting capabilities of "the Sueones", both by sea and by land. He tells us that their ships were built with a prow at each end, and were therefore always ready to be run upon the shore. Now it is quite obvious that a people cannot become expert sailors and boatbuilders in the space of one or two generations. It must have taken the Northmen centuries to learn all they knew about fighting and navigation, but unfortunately, Tacitus does not go very far back in their history and he has no earlier accounts. We know well enough that they were in existence and leading lives of considerable elegance and luxury long before the year one of our era; and we know this, not from the debatable writings of men who may or may not have been telling the truth, but from the indisputable remains with which Scandinavia teems. We learn much, it is true, from the sagas, but there the facts are so much bound up with myths and allegories that it is hard to disentangle them.

Let us try to picture, then, this teeming race of men, conquering the land in which they lived and making it productive, hardened by the bitter cold of

the northern winter, pitting their strength first against stone, then against bronze, and then against iron, and holding their own in all the contests; turning their boundless forests into ships and venturing on a sea that was never calm; finally, when their birthplace became congested, setting sail with their wives and families, horses, cattle, and household gods, to found a home in a new land. Thus they settled in northern France, where they were termed Franks, and in Brittany, where they were called Veneti. These settlements must have been made in very early times, much earlier than the settlements in Great Britain. The vikings, no doubt, robbed and plundered any coast which offered them a fair return for their trouble, but at that time Britain was in such a miserable state that it is hardly likely they would have gained anything there by their pains. The latest notion of the historians is that certain Northmen, finding things getting congested at home, came over with their goods and chattels and settled at different spots along the coast between Hastings and Yarmouth. With them they brought many useful arts, such as weaving, metal-working, and a certain degree of agricultural knowledge; but, what was more important, they also brought and passed on to posterity their qualities of courage and endurance.

Norway and Sweden to-day are rich in museums crowded with ancient remains found in the tombs of the warriors. Of course the dead man's weapons were buried with him, and frequently other articles as well, such as jewellery, vessels, and clothes. Thus a remarkable number of things which the vikings used every day have been preserved, showing us

clearly what kind of people they were. Their swords were damascened as long ago as the years A.D. 1 and 2. Their knives of the Bronze and Iron Ages were beautifully shaped, and often engraved with drawings of ships. Elaborate jewellery, gold and silver jars, beautiful vases of Etruscan glass, probably loot; repoussé and filigree work in silver and gold, show not only that the Northmen had enough ability to make beautiful things themselves, but also that they could value the products of other peoples. The warriors wore coats of chain mail of a delicate and intricate pattern, and shreds of other garments remain to show us the wonderful workmanship, the cloth often being interwoven with silver and gold. Woollen fabrics "keep" badly, and consequently these odds and ends of early weaving are most interesting. In a few cases entire outfits are found. For instance, in an oaken coffin were found a woman's bonnet, bodice, and skirt; and it is thought that the tannic acid in the wood preserved them.

The Northmen have left us another kind of record of their doings in their rock tracings. These are remarkable line drawings which they cut in the rocks, generally choosing a rock whose surface had been smoothed and polished by a glacier in some remote age. The drawings are destitute of perspective, it is true, but they are wonderfully suggestive. They show us men fighting on land and from boats, men ploughing or shooting with bow and arrow, horses, cattle, and different implements. The hero of the fight is always drawn many sizes larger than the other men. It is supposed that on their return from battle the warriors used to occupy themselves with

recording their adventures in this manner. The large drawings must have taken a very long time to complete, and it is from these drawings that we get the clearest idea of the form of the viking ships, just as it is from the sagas that we learn the names by whic the different kinds of ships were called.

His boat was all-important to the viking. Living on a coast seamed and cut by the sea, and encircled by islets, his life must soon have lost its zest if he had been constrained to remain for long ashore. All his desires and ambitions centred round battle and adventure. According to his religion a special hell was reserved for those who died of sickness or old age, so the viking had no fear of death in battle or by drowning, he rather courted it than otherwise, and it is this, partly, that explains the fearlessness of the Northmen. None the less, they left nothing to chance, and their ships were stout and well built. They were, in fact, truly marvellous ships. The Phœnicians, we have seen, put to sea in boats without sea-going qualities. The vikings were the first real shipbuilders. They studied the sea and the behaviour of ships at sea with an intelligence that seems to us, who have taken so many dreary centuries to rediscover how ships should be designed, really amazing. It has been said, quite truthfully, I believe, that if to-day we wanted ships for the purposes for which the Northmen wanted theirs, we could do no better than take our hints from them. The viking ships had a generous run fore and aft, and other points to give them speed and good steering properties. They were good sea boats in the proper sense of the term; they were designed throughout

with scientific understanding of the work they had to do. And it is not the least quality of the designers that they had a high appreciation of the value of fine lines—that their boats were beautiful as racing yachts, as well as buoyant as lifeboats.

All the viking ships were named, and these names, such as *Deer of the Surf*, *Raven of the Wind*, *Soot-coloured Horse of the Sea*, *Lion of the Waves*, show how greatly they valued speed. I cannot describe to you all the classes of boats which the Northmen used, for there were a great many different types, but I will tell you about some of them. Practically everything that floated was called a *skip*—just as we call all kinds of craft boat or ship. The warship was called *herskip* or *langskip*, this last word corresponding with the long ship of the Phœnicians. The finest and largest vessel ever made was called the *Dragon*, so the vikings formed the habit of calling their "super-dreadnoughts" dragons. All the ships were painted in bright colours above the water-line. The most beautiful ship the Northmen ever designed was called the *Ormrinn Langi* or Long Serpent, and served as a standard of elegance. The fastest boat was a *skeid*. It had twenty to thirty rowers' benches and carried up to as many as 240 men. Stores and supplies were carried by a *vistabyrding*. A smaller but more important boat was the *skuta*. It held about thirty men, and was much used in small adventures, while in big engagements it was used for boarding. Fishing boats, similar in shape to the langskip, but much smaller, were called *lagnarskip* or *snekkja*. The Northmen early discovered the value of battering-rams and cased the prows of their warships with

iron. In the Saga of Swarfdaela we find the following passage:—

"Thorstein asked his father to tell him of a viking with whom he might fight, and either fall or gain some fame. His father answered: 'Ljot the Pale is east in the Svía-skerries; he has fifteen ships and a dragon covered with iron above the sea; it sails through every ship: he calls it *Jarnbardi*'."

Sometimes the ships were built with a *Hun Castali* (knob castle), a sort of crow's nest from which the fighters used to hurl stones at one another's heads. The large ships were provided with two or three boats for use in emergency. The men had leather bags to sleep in, and tents or awnings were put up over the ships at night-time, or when they were anchored. These tents could also be taken ashore if it were decided to make a camp. When in their home ports the boats were kept in great sheds.

The ships were usually propelled by great oars or "sweeps", each of which required three or four men to pull it. Occasionally there is mention in the sagas of a man so strong that he could pull an oar alone. It is unfortunate that we do not know the size of these oars. The oars of the *Ellidi*, a small ship, were 26 feet long—a figure that strikes one as a huge exaggeration —and that is the single instance in which the length has been recorded. The vikings were immensely proud of their sails, but these were so shaped as to be of little use except with a following wind. The Phœnician ships had probably more useful sailing gear than the vikings'—at least they had in the hey-day of Phœnician shipping. The sails were generally made of coarse woollen cloth, and, in common with

all early shipping, of all nations, they were wonderfully coloured or embroidered. They were more like banners than sails; and a fleet must have been a wonderful thing to look upon. Sometimes, however,

A Viking Ship

Note the "shield-row", composed of circular wooden shields or targets with big bosses of brass or metal in the middle. Each shield overlapped the next till it touched the boss and so gave double protection to the rowers.

the sails were bleached to the purest white, and the wealthiest vikings had their sails lined with fur. This little extract from the Saga of Sigurd Jorsalafari is illuminating:

"When the king on his return from Jerusalem wished to sail to Mikligard (Constantinople), he lay still for half a month with his entire fleet, although

every day it blew a good stern wind; but he waited for a side wind, so that the sails could be set lengthways on the ships. The sails were mostly covered with pell (a sort of velvet) on both sides, as those in stem and stern wanted to see an equally handsome side. When he came into Mikligard he sailed close to the shore, from which could be seen the whole width of the sails, which were so slightly separated that they resembled a continuous wall. All the people were out to see how Sigurd sailed." Sigurd's performance on that occasion had in it a good deal of what is commonly called "swank", but his fleet must have been imposing, none the less.

The vikings were the earliest arctic explorers. An expedition went to Iceland in the ninth century, and a colony was formed there, the population of which, we are told, reached the number of 50,000 souls. One of the Icelanders, named Gunnbjorn, accidentally discovered Greenland, and the story of this great country over the seas made a grand commotion amongst his friends when he returned home. None of them, however, ventured to test his statements until 983, when Eric the Red was outlawed for killing a man in a fight. The new country offered him a home, so he collected a crew and set sail for the west. On his arrival he explored the coast, and finding it very bleak and ungenial he returned to Iceland to "boom" his colony. He called the land Greenland, in order to attract settlers, not because there was any abundance of vegetation. The result of his persuasions was that twenty-five shiploads of adventurers followed him back to Greenland, where they somehow won a prosperous existence for four hundred

years. It seems almost certain that from time to time the Greenlanders made excursions to the American coasts, but they do not seem to have made any settlements there.

It is worth while to pause here to compare three great nations that did so much towards the conquest of the sea, and in so doing made so much of the world's history. The Phœnicians were purely practical men. They sailed the seas for purposes of trade only, and whatever exploration they achieved was undertaken simply with a view to opening up new ground for trading—in a word, for securing new customers. They provided the world with the beginnings of a commercial education, and this is the point at which their influence ceases and that of the Greeks begins. For the Greeks were artists. They made things that were beautiful, while the Phœnicians made things that were solid. The Greeks followed the sea for the love of her mystery and glamour. They admired the Phœnicians, and eagerly learnt all they had to teach them of the hard facts of navigation. When the Phœnicians built trading stations in out-of-the-way places and began to teach people the alphabet, and weights and measures, the Greeks went after them and built colleges for the expounding of philosophy and the arts. The vikings, on the other hand, seem to have had many of the virtues of both races. They had an alphabet of their own—their runes are amongst the most interesting of their relics—they loved and could produce beautiful things, they colonized waste places, they were great adventurers and fine fighters. They did not decay like the Phœnicians and the Greeks, but merged themselves and their character-

istics into other nations, to the lasting gain of posterity.

Other races of sailors had meanwhile been adding to the story of the sea, but I have not room to tell you about them all. The Venetians, as you know, attained a great wealth and power as a result of their commercial speculations. Yet they started life simply as traders in salt, with "but one kind of food, namely, fish". They carried salt, in time, to every port on the Adriatic Sea, receiving, when they had unloaded their salt, other cargo to be transported elsewhere. They were renowned for their careful seamanship, which rarely lost a vessel. They acquired their knowledge of shipbuilding from the Jadarans, and probably their material too, for they lived in a country in which trees would not grow and no iron could be found. Yet in this Dismal Swamp they created the city which was afterwards called the Queen of the Adriatic—Venice the beautiful; Venice, the city of stately cathedrals and marvellous palaces; Venice, the city in which taste, luxury, and splendour found at one time their highest expression.

As we turn the pages of the history of every country we are confronted by one continuously recurring fact, namely, that in every age, in every crisis the man is ready for the hour. We may not be able always to applaud his policy, he may not have done always the best thing, or have reaped his just deserts, but always he is to be found seizing his opportunity. Thus it is that we find Columbus, a mature man ready for his great work of sailing a ship from the Old World to the New, just at the time when affairs in eastern Europe were becoming serious. We must remember that Columbus did not achieve what he had promised.

He set out to find the western route to India, and his failure to do so was a disappointment to the whole Christian world.

A world without America! Do you realize that even now, in this practical twentieth century, many people, deep down in their hearts, consider America an intrusive force? It is over four hundred years since Columbus saw his island, "rather large and very flat, and the whole so green that it is a pleasure to look upon it", and yet some people have hardly got used to the idea. Can we have even a notion of the disgust which was felt by those interested in the Indian trade route, when it was proved indisputably that Columbus had not found Cipango? None of the contemporaries of Columbus realized that he had discovered a greater country than India, and he himself died broken-hearted.

Why, though, was there all this talk about India? Why did not the old trade route still suffice? The answer is bound up with a story that recently has been revived, with bloodshed and slaughter, and all the horrors of warfare civilized as to means but savage as to motive. In 1453 Constantinople was taken from the Greeks by the Turks: Egypt was held by the Saracens, who imposed severe duties on Christian merchants. At the same time Europeans were demanding more loudly than ever the luxuries that came from Asia. Somehow they had to be fetched, and with as much profit as possible. That is why the traders looked so hopefully to the great ocean of the west, thinking that if only someone could be found brave enough to make the great adventure, their captains could be given a new route for the fleets,

and the greedy Mohammedans would have to look elsewhere for their revenues. The difficulty was to find a man to do it. In those days navigation had not progressed very far. What the sailors did not know about sailing would fill many books larger than this one, but they had a simple method of reaching any given destination. First of all they would sail to some point which they knew to be on the right latitude. Then they would sail straight along this latitude until they reached land, where, I suppose, they made further inquiries.

It is easy to see that this method of navigation had its disadvantages, for if the marines were once blown out of their course they would have no very definite prospect of regaining it. The magnetic needle was known to them, but their charts and maps were sadly incomplete. There were, in fact, at this time two theories with regard to the arrangement of the earth. Claudius Ptolemæus of Alexandria left a map of the world in which Africa figured as a huge continent surrounding the Indian Ocean and connecting with the south-east of Asia. Asia, he believed, extended eastwards indefinitely in the form of swamps, and on this account it was useless to try to reach Asia by crossing the Atlantic. Pomponius Mela, on the other hand, declared that each of the continents was a separate mass of land surrounded by water, and that therefore it would be possible to reach India by sailing round Africa, but he did not appear to favour the Atlantic route. In those days what men did not know they made up, just as some of us do still, and travellers could always find people credulous enough to believe any tale, however fantastic.

These properties of superstition and gullibility have done more to retard every form of progress than anything else; but possibly the traveller's tale was the most readily embroidered, since it was the most difficult to prove. The story of Prince Henry the Navigator brings these facts prominently before us. Prince Henry, the son of John the First of Portugal, "King of Good Memory", and Philippa, daughter of John of Gaunt, was born in 1394. Although he was a fine soldier, he preferred a life of study, and built himself a palace, embracing a chapel and an astronomical observatory, on the farthest point of Cape Vincent. Here he devoted himself chiefly to the study and improvement of the sciences of geography and navigation. The great wish of his heart was to investigate the theory of Pomponius Mela, to which I have referred already, but as that was an expedition not lightly to be undertaken, he began his projects with the nuggets of the Gold Coast for a goal. To begin with, he caused a splendid fleet of boats to be built. They were the best ships afloat at the time, being rowing boats partially decked and carrying thirty or more men. His first noteworthy venture was conducted in 1418 by John Gonsalvez, Zarco, and Tristram Var. They sailed down the African coast, and ultimately were driven by a storm to Porto Santo. A result of this expedition was the colonization of the Madeiras. Other voyages followed, in which the Azores were located; but although Prince Henry used his utmost persuasions, his captains would not penetrate south of Cape Bojador. It is possible that the currents off this cape frightened them, but they gave other and, in their opinion, more convincing

reasons to Henry for their return. They said that God had threatened to turn them black if they ventured past the cape, and also that, farther south, the sun's rays came down in liquid flames. It was not until 1434 that one Gil Eannes actually rounded Cape Bojador, discovering, to his surprise, that the water "was as easy to sail in as the waters at home". But what courage, what superb disregard of those "liquid flames" did this obscure Captain Eannes show!

After this, ship after ship was dispatched to explore the African coast. Each went a little farther than the last, and learnt a little more, until Bartholomew Diaz, in 1486, started out with instructions to find the southern extremity of Africa, come what might. Bartholomew Columbus, brother of Christopher, accompanied this expedition, and when the ships at last rounded the Stormy Cape, as Diaz christened it—King John II renamed it Cape of Good Hope—the route to India seemed clear to him. But that expedition never reached India. The sailors lost heart and refused to go farther, so Diaz was obliged to turn back. By the time the ship returned to Portugal they had covered 13,000 miles, and the Columbus brothers agreed that, though it was no doubt possible to reach India by that route, the distance was too great to make it of much value, and the western route attracted them more than ever.

The story of Columbus is familiar to every boy. I cannot possibly give you details of all the wonderful discoveries which were made between the fifteenth and sixteenth centuries, but I must tell you briefly what took place. Columbus, then, was the first European to sail to the West Indies. Vasco da Gama sailed

round the Cape of Good Hope in 1497, and ultimately reached the port of Calicut. Vincente Pinzon, with Americus Vespucius—the gentleman who gave America its name—as pilot, sailed to Cape Honduras, and thence some distance up the coast northwards; and Vespucius, in 1499, followed the north coast of South America, meeting an English ship as he did so. No one dreamed that this southern continent found by Vespucius was connected with the northern one found by Pinzon. Next we read of Magellan, who sailed round Cape Horn as far as the Philippines, thus linking up the Old World with the New. Lastly, let me mention John and Sebastian Cabot, the first of whom explored the northern coast of North America, while the other opened up a trade route along the north of Europe and Asia to China.

At this point events come crowding fast upon one another. We have seen how various nations have held the supremacy of the seas, or such portions of the seas as they dared to venture upon, until, in the fifteenth century, Portugal and then Spain were the dominating countries. But you must not think that these last-named nations were actuated solely by a desire for gain and adventure. The motive which inspired their most desperate efforts was their religion. They believed that God would make them some definite return for every convert to Christianity that they could obtain, and they had no objection to sacrificing a small number of souls in order to win a greater. Nowadays we may call such a view arrogant and bigoted, if we like, but there is no doubt that it was the lash which urged our own countrymen to their best efforts. According to modern ideas the

life of a sailor in the Middle Ages was a dreadful one. The ships themselves were seldom seaworthy, and often put to sea in an actually rotten state, both as to hull and gear. The crew's quarters were villainously overcrowded; the food was vile and often insufficient; and dreadful disease was with the ship on all long voyages. The discipline, or rather, the brutal punishments by means of which shipmasters sought to maintain discipline, was a sad blot on the progress of civilization. All sorts of tortures were employed to keep refractory crews in order. For trivial offences a man might be nailed to the mast with nails driven through his hands. Keel-hauling was an extra-refined punishment reserved for other offences. In this a special arrangement of ropes enabled the offender to be dragged naked underneath the ship's keel, so that the barnacles scraped all the skin off him. The process was repeated several times, until the poor wretch could stand no more, or until the captain regarded his sin as expiated. When a man was killed, the assassin and his victim were bound together and flung overboard. These are random samples from a great stock-in-trade of cruelty which was not exhausted until comparatively recent times.

Nor can we say much for the moral code of the times. Slave-catching was a profitable business. Catholics thought no ill of betraying and butchering heretics, and one cannot deny that Protestants treated Catholics in much the same way. Might was right in those days, and international law—what little there was of it—was vague and slow to act.

The English were not the only people to revolt openly against the Spaniards. England under Mary

was a poor, dispirited, uneasy place, in which extremes of courage and cowardice alike found a home; a place which bred ferment, suspicion, and concealment, cruelty and greed, as well as purity of purpose and steadfast loyalty and faith. But the nation as a whole was too cowed to do more than murmur against the rule of Mary, which was really the rule of Spain. At the same time another country, owning much the same ancestry as Britain, was being oppressed by the same cruel conquerors. In the story of the revolt of the Netherlands we must not forget that we are dealing with people possessing a trace of viking blood. The wonder is that they ever submitted to Spanish rule; but the Spaniards were hard masters, who brought brutality to a fine art.

Of course you have heard of the Hansa Towns. The word "Hanse" means a league, and corresponds in some way with the guilds which flourished in mediæval England. In the early Middle Ages life and property were terribly insecure; and in Germany and its provinces transport by land was as perilous as by water. Pirates infested the seas and robber barons controlled the roads. The exploits of these gentry make excellent reading in this comfortable twentieth century, but I doubt if the poor traders found much to admire in their habits. To resist these and other wrongs the merchants (who were, of course, the townsmen) bound themselves together in what we now call the Hanseatic League; and by degrees this league grew so strong that it became the ruling force in Germany. The Germans of those days could colonize, and towns along the Baltic coast developed and prospered, helped by immigrants from

Scandinavia. These people were all engaged in trade, and the towns on the sea-coasts bred a fine race of sailors. All this has its significance, as you shall see.

For one thing, the example of the Hansa towns was followed by the Dutch. The humble herring was the means of elevating the sailors of Holland to a position in the trade of the world which actually made them successful rivals of the Hansa towns. A very large trade in herrings was carried on at that time, for it was a fish that was plentiful and nourishing, and therefore of great value in Lent and on fast-days. The Dutch found a new way of curing the herring by which the fish could be kept all the year round. It was just about this time, when the Dutch were awakening to a sense of their own possibilities, that they became subject to Spain. This might or might not have checked their progress; we cannot say what would have happened had not one other great influence been at work. This was, of course, the spirit of the Reformation. The Dutch went over wholeheartedly to the Lutheran movement, and the Spaniards retaliated with the Inquisition. This was more than the descendants of the free vikings could stand, and a fierce guerrilla warfare between the two nations followed and continued for many years. The Dutch were poor and their boats were bad. The name of "sea beggars", flung at them insolently by a Spanish noble, stuck, but came to have a terrible meaning. For the Beggars were desperate fighters, who neither gave nor expected quarter. Whenever a Spanish ship of moderate size came within reach of one of the Beggars' ships it was boarded and every Spaniard was put to death; time and time again such

encounters took place. Nor did the Dutch confine their attentions exclusively to Spanish boats; they thought that, as it was a religious war, ships of any other Roman Catholic nation were equally their prey. In this way they grew rich and important to such a degree that, in 1621, the shipowners joined together to form the Dutch West India Company. This company not only traded and colonized, but it promoted "the welfare of our Fatherland . . . by acts of hostility against the ships and property of the King of Spain and his subjects".

Elizabeth ascended the throne of England in 1558. She found the country weakened by pestilence and wars. The exchequer was empty and the fleet ruined; agriculture was at a standstill; the coinage and, consequently, commerce were in a debased and rotten state. Mary had taken her people on the headlong road to ruin. Elizabeth helped them back to prosperity and peace. We cannot concern ourselves here with her political difficulties and ambitions; it is of the ships she built that I would speak for a moment, and of the remarkable men who appeared in England at that time and obtained for her the supremacy of the seas. The bolder spirits burned to avenge the wrongs they had suffered at the hands of Spain, for Spanish influence had brought about nearly all the miseries of Mary's reign. Moreover, the Spaniards held the New World, and would-be intruders knew that they would be handed over without ceremony to the tender mercies of the Inquisition. Elizabeth has been called weak and miserly because of her refusal to make war on Spain, but in reality she showed her wisdom. She was not ready for war, and she did not mean to waste

the newly revived energies of her people in futile campaigns. She did, however, encourage her commanders in their semi-lawful attacks on Spanish ships.

The first English seaman to attract attention in Spanish waters was John Hawkins. His two first trading expeditions we need not describe, beyond saying that in both of them he was dishonourably treated by the Spaniards, although nominally the two nations were at peace. The third venture, however, needs more detail, as it was really the beginning of the end of Spain, and also because Francis Drake sailed with it as captain of the *Judith*. Imagine, then, the little fleet of English boats repairing the ravages of storm and stress in the harbour of Vera Cruz. Imagine, too, twelve Spanish ships laden with treasure, scarcely defended, lying in the same harbour. Hawkins, with British honour, took no notice of these tempting prizes; but an incident of the next day showed him how diferently the Spaniards viewed the situation. Twelve Spanish ships, all well armed, carrying gold, silver, and jewels to the worth of nearly two million pounds, appeared outside the harbour, which they did not dare to enter on account of Hawkins. Hawkins, in view of the queen's openly expressed wish that there should be no war, applied to the Spanish admiral for a written declaration of peace. This was given to him. The Spanish ships then entered the harbour and took on reinforcements, after which they opened fire on Hawkins. Only two of the English ships escaped and returned to England.

Hawkins and Drake then demanded compensation from Philip, whose refusal to give it does not seem to have surprised them. One course only now re-

mained to our two captains. They applied to Elizabeth for a "Letter of Reprisal", which gave them permission to set out at their own expense and risk to capture as much Spanish booty as would pay for their losses with interest. Who fixed the interest we are not told; no doubt it was left to the discretion of those taking reprisals. It was while he was upon one of these voyages of retribution, having, in addition to his own wrongs, a new plot of Philip's to assassinate Elizabeth to avenge, that Drake captured Nombre de Dios, at the north of the Isthmus of Panama, and was taken by some friendly Cimaronnes to a tall tree, from which he saw the Pacific Ocean for the first time.

Naturally he was filled with a burning desire to navigate it, but he was not able to fulfil his ambition all at once. It was not until nearly five years later that he sailed from Plymouth in the *Pelican*, a little boat of 100 tons, with five smaller ships, one being only 15 tons. The expedition wintered at Port St. Julian, and then the other ships turned back. Drake alone went on in his *Pelican*, and entered the Pacific Ocean on 28th October, 1578, whereupon he renamed the *Pelican* the *Golden Hind*. He made a triumphant progress up the west coast of South America, taking treasure and prizes from Spanish ships as he went, till, fearing vengeance, he determined to go home by the Cape of Good Hope. For this purpose he refitted his ship at a port that was probably San Francisco, and set sail on 23rd July, 1579, arriving home in the following year with about a million pounds' worth of jewels and plate in his hold.

As you know, Elizabeth rewarded Drake with compliments and a knighthood, and gave him command of the fleet with which he captured San Domingo and Cartagena. The defeat of the Invincible Armada, and the heroic courage of Greville of the *Revenge*, not only showed the Spaniards what kind of enemy it was they were trying to overcome, but also proved to the English of what they themselves were capable.

In other waters, meanwhile, another class of seamen was serving its apprenticeship and forming its character. When Cabot returned from his expedition to North America he let fall one remark which was, possibly, the most valuable he ever made. He said there were so many fish in the waters of Newfoundland that they sometimes hindered the ship. Fish, as I mentioned before, was a very important article of food in the Middle Ages, and fleets of fishing boats of all nationalities soon made their way to the Banks. Conditions of life on the Banks to-day are hardly palatial, but at any rate the boats are decked and warm, and a sufficiency of food can be carried. But in the sixteenth century the boats were only half-decked, and were hardly seaworthy. We read of hulls being bound with ropes to hold them together. Mutineers were slaughtered and weaklings died. The men knew nothing of the spaces that surrounded them, the fields of ice which they saw in the intervals between fogs, and from which came shrieking hurricanes and terrifying visitants from the supernatural world. Men who could brave these terrors and hardships were fit for anything, and therefore they were always desired by the great adventurers. Banks fishermen sailed in the expeditions of all those who went out to singe

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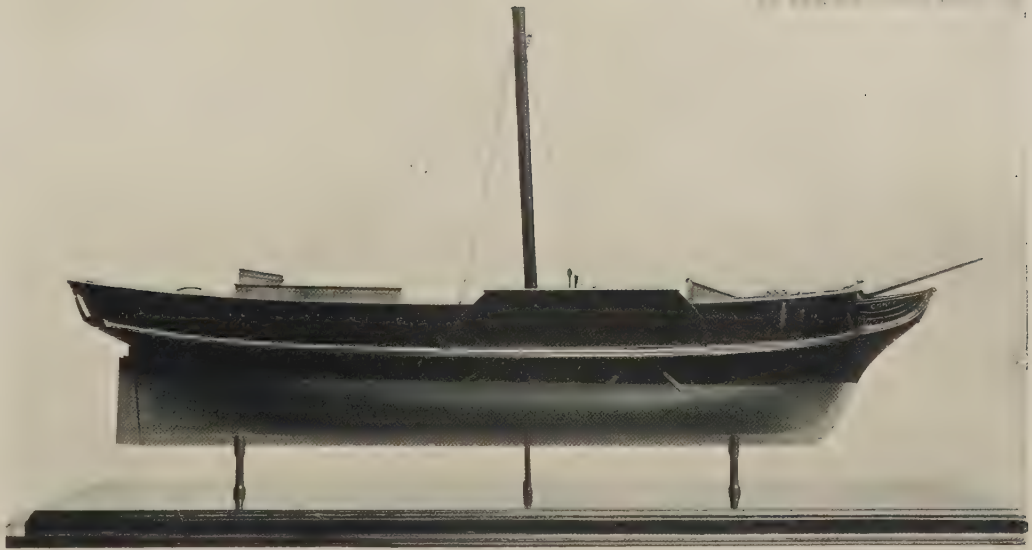
A REPRODUCTION OF COLUMBUS'S CARAVEL SHIP *PINTA*

The model of this caravel was made by order of the Spanish Government for the World's Columbian Exhibition, 1892, and this photograph was taken when the ship was in American waters.



A MODEL OF BELL'S *COMET* IN THE M'LEAN MUSEUM, GREENOCK

Henry Bell is practically the father of steam navigation. In 1812 the *Comet* started on her famous career as a regular passage boat between Glasgow and Greenock. Three years later the Thames followed the lead of the Clyde and inaugurated a service with the *Margery*, which made the trip to and from Gravesend.

the King of Spain's beard, and it was to their bulldog courage no less than to the organization of their leaders that the English successes were due.

I have taken you now some way beyond the beginnings of shipping, for I have told you of the beginnings of Britain's colonization and her supremacy of the high seas. This did not come all at once. The Dutch pressed us very hard in the sixteenth and seventeenth centuries; in fact, our position was not completely assured until after Trafalgar. For the present we hold it by the virtue of the courage and persistence of the ancestors who won it for us, and by virtue of these qualities in ourselves, so far as we inherit them. It is "up to us" to keep our supremacy, not by right of might, but by the might that lies in right and honour. For it is not the proudest or wealthiest nation that rules the seas, but the best — the most honourable, the bravest, the most God-fearing.

This chapter was to be about ships and shipping. I am rather afraid I have neglected the ships for the sake of the pleasure of wandering with you through some thousands of years of sea history. But, after all, descriptions of early ships would only bore us, and as a matter of fact we really know very little of what they were like. We have, it is true, contemporary accounts of ships in all ages; but as very often the writers who described them had never seen a ship, they are not very reliable.

CHAPTER III

The Birth of Steam Navigation

"By the figuration of Arte itselfe, there may be made instruments of navigation, as large as ships, to brook the sea, onely with one man to steer them, which shall sayle more swiftly than if they were full of men."

So wrote Roger Bacon—according to an early translator—in the thirteenth century; while William Bourne, in 1578, announced that "you may make a boat to goe without oare or sayle by placing a certain number of wheeles on the outside of the boate, in that sorte, that the armes of the wheeles may goe into the water, and so turning the wheeles by some provision, and so the wheeles shall make the boate goe". Thus the idea of propelling ships by some means other than oars or sails was familiar to men's minds hundreds of years ago, the only difficulty in the way being the "some provision" which should make the scheme possible.

Those were the golden days of the adventurer. Great new lands, of vast wealth and promise, were becoming accessible to the courageous, but even then competition was keen. The man who could be first upon the field and could slip away from pursuit was the successful man; but though there might be great differences in the speed and capabilities of sailing

craft, all ships were subject to the same weather, the same storms, the same contrary winds, and the same calms. The thing that was wanted was a ship that could be driven on a straight course against the wind, and was not dependent on fickle airs for her progress.

The first step in the right direction was taken by Thomas Savery, who designed a boat driven by a primitive kind of paddle-wheel. Across his boat he fastened a shaft having four oar blades fixed at right angles to each end, and by an arrangement of cogs at the centre of the shaft, connected with a capstan below worked by sailors, the oars were caused to rotate. Needless to say, this suggestion met with little encouragement, but Savery's name is of importance, because in 1698 he took out a patent for a steam-engine to be used to drain mines. He did not apparently connect the two ideas in his own mind, for the credit of the first paddle-boat worked by steam is given to Jonathan Hull, who patented his design on 31st December, 1736. From this time forward, as the steam-engine improved in efficiency, the steamboat occupied an increasing place in the minds of men of commerce and industry, who had by the nature of their work the greatest interest in all projects relating to transport.

But it was found surprisingly difficult to arouse public interest in the steamboat, and that this should be so is easy to understand when we remember that the public as a whole had never expected and never wanted water locomotion to be altered. Improvements in sailing ships had been many and various since man first spread a sail to catch the wandering breeze, and the seventeenth-century public, if it

thought of progress at all, which is doubtful, expected the ships of the future to attain greater speed and power by some new arrangement of sails and masts. Sir Walter Raleigh considered that in his time ships had been "greatly bettered"; but we know that according to our ideas Raleigh's ships were nothing more than unseaworthy tubs. Raleigh was executed in 1618, and it was a hundred and eighteen years later that Hull published his suggestion already referred to, which contains the germ from which our modern floating cities have developed.

Grave difficulties presented themselves to the pioneers of steam navigation. One of them was overcome when James Watt produced his condenser, which reduced by so much the amount of fuel burnt by steam-engines. But the problem which still remained was the effectual conversion of the up-and-down movement of the piston into the rotary movement of the shaft. Jonathan Hull wanted to do it by a very intricate combination of bands and straps, but nobody cared for his system. It was too complicated. Of course you know as well as I do what had to be done, but in those days nobody thought of applying the principle of the crank to a steam-engine for marine purposes. In 1781, however, a man named Steed patented a crank which was to achieve the desired end. We hear no more of Steed, and it is probable that he did not invent his crank himself, but only developed an idea picked up during a visit to Boulton & Watt's workshop. At any rate, he succeeded in bringing to the notice of the experimenters the one thing necessary to expedite the introduction of steam navigation.

It is impossible to describe in detail all the experiments which followed upon the adoption of the crank. The activities of men of all classes and several nations were centred upon the perfection of the steamboat, but, like innovators and men of genius of all ages, they found themselves and their ideas treated with indifference, if not open scorn. Great Britain, as usual, hung back at first, leaving the elementary experiments to France and the United States. The name of William Henry, a native of Chester County, Pennsylvania, is of great interest, for Henry not only made model steamboats on his own account, but his influence is traceable in many of the achievements of younger men. As early as 1763 Henry built a steam-engine which he fitted into a paddle-boat, but unfortunately, at its first trial, the little boat was capsized and sank. This attempt was followed by others, but although Henry was convinced of the practicability of his idea, he never succeeded in producing an efficient steamboat. The chief importance of his models lies in the fact that they were seen and examined by Robert Fulton and John Fitch, two men who devoted the best parts of their lives to the solving of the problem of steam navigation.

The work of James Watt had, as was to have been expected, aroused great interest among experimenters on the other side of the Channel. The Marquis de Jouffroy, an enterprising gentleman of a mechanical turn of mind, and, what was more important still, some capital, took up with enthusiasm the idea that a paddle-boat might be propelled by one of Watt's steam-engines; and together with two friends, Comte d'Auxiron and Chevalier Charles Mounin, set himself

seriously to the task of producing a steamboat. D'Auxiron in 1770 resigned his commission in the army and gave his whole time to the subject, with the result that in 1772 he was able to lay before M. Bertin, the Prime Minister, the plans of the new boat, receiving in return the promise of a monopoly of steam navigation on rivers for fifteen years, provided his plans should prove practical. Accordingly a company was formed consisting of D'Auxiron, Jouffroy, the Marquis d'Yonne, Follenai, and the Comte de Dijon, to provide the funds, and the building of the first boat was begun in December, 1772. I cannot say that the building went ahead rapidly—no doubt, this being a first attempt, mistakes were made, and the same thing had to be done several times over: at any rate, when next we hear of the boat, she is lying at the wharf, still unfinished, in September, 1774. She is destined never to be finished, as it happens, for by some means or another she springs a leak and founders, before our very eyes as it were. Unfortunately, the company took the matter badly, and after accusing poor D'Auxiron of arranging the catastrophe, declined to furnish any money for the salvage of the vessel. The courts, however, thought differently, and demanded that the money should be found, but meanwhile D'Auxiron had died of apoplexy.

All D'Auxiron's papers relating to his invention, including a transference of the monopoly, were given to Jouffroy, who at once started a new boat with the help of Jacques Périer. This boat, when tried on the Seine, was unsatisfactory, and Périer refused to take any further interest in the scheme. Jouffroy

then left Paris, and went to live at his country seat on the banks of the river Doubs. Here he struggled along with the help of the village blacksmith, his efforts being rewarded when, on 15th July, 1783, a steamboat of his building made a public demonstration at Lyons, which was entirely successful. Jouffroy naturally was jubilant, and applied for the reversion of D'Auxiron's monopoly, which had been promised to him. The Government, however, declined to grant it, on the grounds, seemingly insufficient, that the trial had not been made in Paris. Having spent the best years of his life and the greater part of his fortune in thus vainly attempting to benefit his country, Jouffroy rejoined the army, and wasted no more energy upon the steamboat. Thus France lost the honour of being the first nation to adopt steam navigation.

To return to America, in 1786 James Rumsey, assisted by Fitch, propelled a boat by steam against the current on the river Potomac, at a speed of four miles an hour. He also died of apoplexy at the early age of fifty, while he was in the act of explaining his ideas before a learned society in London. Shortly after his death, in 1793, a boat of his design successfully steamed up the Thames, but his pet device of "hydraulic or jet propulsion" never passed the experimental stage, although it is still adopted sometimes for special work. The partnership between Rumsey and Fitch did not last long, Fitch joining forces with a Dutch watchmaker named Henry Voight, whose ingenuity and experience in mechanics were invaluable. Fitch laboured for many years with varying success, always learning by his mistakes and

improving his designs, until in 1790 one of his boats made seven miles an hour on the Delaware river, and was installed as a regular passenger boat, going between Philadelphia and Trenton. But disappointment lay before him. The patent for which he had been appealing so many years was granted on 26th August, 1791, but by that time his funds were exhausted, and he had no means of finishing his latest ship, the *Perseverance*. An expedition to France and another to England did him no good, and in despair he is said to have cried: "The day will come when some more powerful man will get fame and riches from my invention; but no one will believe that poor John Fitch can do anything worthy of attention."

Robert Fulton was born in Lancashire county, Pennsylvania, in 1765. His early taste turned in the direction of anything mechanical, and he learned the trade of watchmaking, devoting his spare time to sailing model paddle-boats on the Conestoga—the stream which received William Henry's first efforts — and painting. In fact, he had decided to become an artist, and with this end in view he visited William Henry in order to study his collection of Benjamin West's pictures. It is worthy of mention here that Benjamin West himself owed much to Henry's influence, for he it was who urged West to attempt the historical pictures which made his fame. Fulton, on the other hand, received impressions of another kind, for Henry's collection of models and plans fascinated him completely, and although he struggled with his painting until he was nearly thirty, he finally gave it up in favour of mechanics.

Photo. Gibson & Sons, Penzance

AT THE MERCY OF THE WAVES

The s.s. *Wimborne* driven ashore near Tol-peda on the Cornish coast.

In the year 1793, or about that time, Fulton definitely gave up the profession of painting and became a civil engineer. In this new capacity he went to France in 1797, and there began making experiments with his two new toys, steamboats and torpedoes. It is even a matter of history that Great Britain, during the war with France which opened the nineteenth century, was seriously concerned on account of Fulton's devilish torpedoes; but, as events turned out, she had no need to distress herself, since the French Government, with the proverbial stupidity of governments, refused to look at his steamboats, his torpedoes, or at Fulton himself. So he took himself off home, by way of England, where he paid a visit to Boulton & Watt's works, and ordered a steam-engine; incidentally, it is said, picking up the ideas which ensured the success of his *Clermont*. In the meantime Robert Livingston, a steamboat enthusiast with whom Fulton had worked in France, had also gone home, and he and Fulton immediately began upon a large boat which, when Boulton & Watt's engine had been set up inside it, was christened the *Clermont*, and began to ply between New York and Albany.

What the general public thought of the novelty is told by Colden in his biography of Fulton: "Notwithstanding the wind and tide were averse to its approach, they saw with astonishment that it was rapidly coming toward them; and when it came so near that the noise of the machinery and paddles was heard, the crews (if what was said in the newspapers of the time be true) in some instances shrank beneath their decks from the terrific sight and left their vessels

to go on shore, while others prostrated themselves and besought Providence to protect them from the approach of the horrible monster which was marching on the tides and lighting its path by the fires which it vomited."

The *Clermont* proving such a success, Fulton soon organized several other river services, and also built steam ferry-boats to ply between New York and Jersey City and New York and Brooklyn. These boats could carry three or four hundred passengers as well as eight carriages and thirty horses, and were considered masterpieces of convenience and power.

In 1812, America being at war, Fulton conceived the bold idea of a steam battleship. This was to be an enormous vessel of the unprecedented length of 156 feet and of 2475 tons burden. His suggestion being accepted by the authorities, the monster was begun on 20th June, 1814, and in a little more than a year was ready for her trial trip. This she performed to the satisfaction of all concerned, making the voyage to Sandy Hook and back in eight hours and twenty minutes. Her armament comprised thirty 32-pounders, and also—a provision which may well seem absurd to us to-day—large pumps which were to direct streams of water on to the enemy's ships and wet his ammunition! It is sad to have to relate that Fulton did not live to finish his big baby, but died, after a short illness, on 24th February, 1815.

Active and brilliant as her inventors undoubtedly were, America did not take quickly to steam navigation on the sea. Her trade was confined to sailing ships long after Great Britain had begun to make use

of steam. One of the reasons for this was that Great Britain, not being able to compete with America in regard to the construction of fast-sailing vessels, turned her attention to steam; but there was another factor which influenced her apparent backwardness. America is surrounded by the ocean. All her experiments with sea-going steamers had to be made either on the Atlantic or the Pacific, neither of them being as comfortable for experimenters as the proverbial mill-pond. Great Britain, on the other hand, has extensive coast-lines fronting sheltered waters. The Irish Sea, protected from the west by Ireland and from the North Sea by Scotland, the English Channel, and the Straits of Dover, all offered ideal opportunities for short sea cruises, admirably suited for trying the temper and capabilities of the new motive power. British innovators, however, had just as many trials and disappointments to face as those of other countries, for the way of the inventor, until recent years, never has been rosy.

If you know the town of Helensburgh on the Clyde you will know that Henry Bell is the man to whom the world gives most of its gratitude for all the benefits of steam navigation; but he was not the first Scot to construct a practical steam-driven vessel. An Edinburgh banker named Patrick Miller, with the help of his son's tutor and a mining engineer named Symington, built a little boat which used to puff about on a lake near Dalswinton, in Dumfriesshire, at the rate of 5 miles an hour, while another boat of their designing did useful work on the Firth of Forth and Clyde Canal. At that time (1801–2) the canal was owned by a company of which the governor was Lord

Dundas. Lord Dundas was an enterprising man, and when he saw Symington's boat hauling heavy loads at a steady speed of 7 miles an hour he thought the new idea was worth consideration. Accordingly he gave Symington instructions to build a boat, which he named after his daughter, the *Charlotte Dundas*. This vessel is famous, for she marked the first really successful achievement of steam navigation, her greatest feat being to haul two loaded sloops of 70 tons each 19½ miles in six hours against a strong wind. Unfortunately the action of the paddle-wheel was too vigorous for the canal, and out of respect for its banks the *Charlotte Dundas* was taken out of action. It is extraordinary to us that, after so convincing a demonstration of the power of the steamboat, popular and even expert opinion should have been so slow to awake to its significance. So inventive and profound a man as James Watt thought lightly of its possibilities, or rather, of the possibility that men of that day would be able to solve the manifold difficulties of steam propulsion at sea. But although Henry Bell wrote to Watt for advice on the matter and received nothing but discouragement, he persevered with the problem in his own way.

To begin at the beginning of the story, Henry Bell was born at Torphichen Mill in Linlithgowshire on 7th April, 1767. His father was a wheelwright, and Bell learnt the trade after he had spent a few years at the village school. It is possible that he saw and examined the *Charlotte Dundas*; some authorities assert that he did and others that he did not: but however that may be, the steamboat early became an obsession with Bell, and in 1803 he appealed to the

Admiralty for help and support for his project. Their learned lordships gave Bell's suggestion their august consideration; and presently informed him that "they had come to the conclusion that it would be of no value in promoting transmarine navigation"—which was, of course, the only conclusion they ever came to, when innovations and improvements were brought to their notice. To poor Bell such a reply was disappointing in the extreme, but nevertheless he made a second venture. On this occasion he had the support of Nelson, whose memorable speech ought to have carried weight with the Admiralty.

"My lords and gentlemen," he cried, "if you do not adopt Mr. Bell's scheme some other nations will, and in the end vex every vein of this empire!"

Since his own country would have nothing to do with him, Bell sent particulars of his idea to various European governments, and also to the United States. The last-named government appointed Fulton to correspond with Bell on the subject, a correspondence from which it is possible that Fulton derived more benefit than Bell. However, by this time Bell was a person of some substance, being largely interested in a bathing establishment at Helensburgh, and he conceived the brilliant idea that a steamboat service between Glasgow and Helensburgh would serve the twofold purpose of advertising his baths and his steamboat. Accordingly the little vessel was begun which ultimately appeared before the world as the *Comet*. She was launched in 1812, and immediately started on her famous career as a regular passenger boat, plying between Glasgow and Greenock. Passengers were required to pay three shillings or four

shillings according to the class they patronized, and the service was an immediate success. Daniells, in his *Voyage Round Great Britain* (1818), thus described the new means of locomotion:—

"In proceeding from Greenock to Dumbarton, a conveyance offered itself which forms a very striking peculiarity in the navigation of the Clyde. This was the steamboat, of which a sufficient number have been established to maintain a constant intercourse between Glasgow and Greenock. They can depart during any period of the tide, and in all winds, and perform the journey generally in three hours. . . . It is observable that the smoke of the engine is carried off by a tall cast-iron chimney, bearing the semblance of a mast, and sometimes serving as a substitute for one, when the state of the wind will allow the sail to be hoisted with advantage. The stream of smoke from the orifice generally takes a horizontal direction in consequence of the movement of the vessel, forming a pendant of extraordinary length and of very singular appearance. By this signal the people can distinguish the steamboats at a very great distance. . . .

"The steamboat takes in and lands passengers at Dumbarton and Port-Glasgow, and the mechanism of her motion is such as to allow her to touch at these places with the least possible delay, and to lie-to or resume her course with equal promptitude. The rate of moving is delightfully uniform and rapid, and it is particularly amusing to observe with what ease she will outstrip a vessel though under full sail."

Steam navigation on rivers thus became an accepted fact, the first steamboat appearing on the Thames

on 23rd January, 1815. She was named the *Margery*, and paddled down to Gravesend one day, returning the next. The *Richmond* and the *Regent* soon followed, each being a little larger than its predecessor; while the acme of comfort was reached by the *Thames*, which made a daily trip to Gravesend, and informed intending patrons that "persons bringing their own provisions will be assisted with boiling water, provided in readiness on board". The *Margery*, it must be remembered, was built by William Denny of Dumbarton, and therefore had to make her way to the Thames via the Forth and Clyde Canal to Grangemouth, and thence down the east coast.

From the trivial circumstance of the acquiring of a hotel at Helensburgh by Henry Bell's wife arose the enormous shipbuilding industry which now flourishes on the Clyde. David Napier, an engineer of Glasgow, took up the new project with enthusiasm, and in 1818 started a steamboat service between Glasgow and Belfast, the *Rob Roy*, built by William Denny and himself, being the first vessel of the service. Already, in 1817, James Watt had crossed the North Sea in a steamer named the *Caledonia*, and had ventured up the Rhine as far as Coblentz; and trips from London to Margate were inaugurated as daily events in 1815, so that steam navigation by sea was well established. Many of these boats, however, carried sails as well as steam-engines, and performed as many miles by the old motive power as the new. It was from this cause that our American cousins lost the glory of first crossing the Atlantic under steam. A transatlantic steam service had been mooted and vetoed many times since the beginning of the century,

but the idea had taken firm hold of the minds of ship-owners of the advanced school. The first boat to steam across the Atlantic was the *Royal William*, a Canadian vessel, which made the journey from Quebec to London in seventeen days. She was followed by the *Savannah*, which was intended to inaugurate the American transatlantic service. The *Savannah*, under the command of Captain Moses Rogers, started from Savannah on 26th May, 1819, and reached Liverpool on 20th June, but a pathetic entry in her log, "No cole to git up steam", reveals the reason of her failure to fulfil the required conditions. As a matter of fact she steamed for eighteen days, but the remainder of the voyage had to be made under sail. "Cole", of course, was used in its strict dictionary sense, and was not meant to denote *coals*, pinewood being the fuel in use.

From this time onwards, steam as an auxiliary motive power for sailing vessels became more and more common. It was found impossible to carry sufficient fuel for a long sea voyage, and public opinion was still contrary, many otherwise sensible persons declaring that Providence having arranged winds and tides for the express purpose of delaying ships, it was wicked to try to produce a ship which should not be hindered by these forces. However, progress was inevitable. Combined sail and steam ships continued to cross the ocean from the New to the Old World, visiting all the great European and Asiatic ports, until, in the year 1838, the knell of the sailing ship was rung when the *Sirius*, steaming out of Cork on 4th April, and the *Great Western* out of Bristol on 8th April, both arrived at New York

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THE GROWTH OF THE CUNARD LINE

A contrast between the *Scotia*, which made her first voyage from Liverpool on 10th May, 1862, and the great modern liner the *Aquitania*. The *Scotia* was the last of the paddle-wheel steamers in the Cunard service.

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THE *AQUITANIA* IN DRY DOCK

An illustration which exhibits not only the great height but the beautiful "lines" of the famous Cunarder.

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on 23rd April, having performed the whole distance under steam.

At this point we must leave the story of the development of the steamboat, although it may be contended that we have gone no farther than the beginning, for the improvements and alterations in design and construction have been so many and radical since the first voyage of the *Great Western* that by no possibility could they be treated in the few hundred words available. Besides, you will find out all about the subject in the *Encyclopædia Britannica* or any other good encyclopædia, while a visit to the engineering section of the South Kensington Museum will give you a better conception of the progress of this particular branch of industry than a multitude of text-books. There are timorous and desponding spirits amongst inventors as amongst every other class of person—James Watt was one of them—but the confidence given to them by the success of the steamboat resulted, ultimately, in the production of improved engines and better types of vessels. But the task was no light one. At that time trans-oceanic travel was undertaken for business purposes only—a trip to America for pleasure or sport being an unheard-of extravagance — consequently passengers other than emigrants were comparatively few. On this account the first ships to follow the *Great Western* on the England-America service were financial failures, and were withdrawn, the *Great Western* only being kept running at a loss. The main differences between steam and sail boats must be borne in mind. The sailing ships were slow, but they were safe and bound to come into port sooner or later unless they encoun-

tered exceptional bad luck. They were, moreover, cheap to run, and offered large spaces for the carriage of cargo. Steamboats, on the other hand, were rapid —too rapid to be safe, according to the views of those days—and while they did not require so many men as the sailing ships they were very expensive in the matter of fuel, and the fuel and engines occupied a great deal of room to the exclusion of profitable goods.

It is to the enterprise of Mr. Samuel Cunard, a Canadian, that the establishment of a regular steam service is due. Cunard came over from Halifax in 1839 with the fixed intention of starting a company to run steamships across the Atlantic. In a very short time he had entered into negotiations with George Burns of Glasgow, and David M'Iver of Liverpool; the result of these negotiations being the inauguration of the famous Cunard line. The capital was soon raised with the assistance of the Government, which promised a large subsidy for mail service. The company started with a fleet of four paddle steamers: the *Britannia*, *Acadia*, *Columbia*, and *Caledonia*, each about 207 feet long and of 1154 tons burden, which performed the voyage at an average speed of 8½ knots. From these small beginnings has sprung the great line of to-day, with its *Lusitania* of tragic memory, which was capable of 618 knots in twenty-four hours; its 900-feet-long *Aquitania*, of 47,000 tons; and its twenty-three other fast and well-equipped vessels. Cunard was rewarded with a baronetcy in 1859, and died in London in 1865.

A rival line, of American origin, was started in 1850 under the name of "Collins", while still a third, the "Inman", followed shortly after. The Collins

line, which comprised four paddle-boats, came to an abrupt ending after only eight years of existence. Two of the boats had been lost, and, the line having got into disrepute owing to bad management, the United States Government suspended the subsidy it had been paying for mail service. But a still more potent factor in the failure of the Collins line was the success of the Inman. The Inman entered the field with two iron screw-propelled boats, the *City of Glasgow* and the *City of Manchester*, both built on the Clyde by Messrs. Tod and M'Gregor. The Inman line was subsequently incorporated with the American line.

In spite of the efficiency shown by the new type of boat on the Inman line, the Cunard company did not adopt iron ships immediately. In 1852 they launched a new wooden paddle steamer, the *Arabia*, and it was not until 1855 that they acquired their first iron boat. This was the *Persia*, and her successor, the *Scotia*, also an iron boat, was the last paddle-boat built for the company. The iron ship had thus left the wooden one far behind in the race for supremacy, but the issue had been doubtful. The natural argument of the public was: "An iron ship is an impossibility; a piece of iron sinks, and so would an iron ship." The experts were equally hard to convince, and talked learnedly about resistance and perforation. In fact, we cannot help wondering how long it would have taken the iron ship to find its place if it had not been for the regrettable accident to the *Great Britain*. The *Great Britain* was a screw-propelled iron ship built by the great Brunel, in 1839, and is generally considered to have come before her time. She materially advanced the cause of the iron ship, not by her great

strength, but by running aground in Dundrum Bay, during her fourth voyage from Liverpool to New York.

Here she lay, to the intense distress of her owners, for eleven months, at the end of which time she was refloated and found to be little the worse. Shipbuilders from all parts of the country went to inspect the damaged vessel after she had been docked, and their opinions were unanimously in favour of the new material. Some twenty years later another revolutionary change in shipbuilding was effected, when iron was discarded in favour of steel. The French had proved the good qualities of steel for constructing vessels some time previously. Iron hulls were calculated to be about thirty per cent lighter than wooden ones, but steel hulls are about fifteen per cent lighter still, while their strength and resistance are infinitely greater. Steel, however, is much more subject to fouling than wood, and for this reason wooden keels, sheathed with copper, are sometimes adopted on steel ships.

CHAPTER IV

Fishing and Fishermen

To a very large proportion of the community the sea has no other use than to provide us with fish. Conversely, a very large proportion of the community never thinks of it as anything but a source of enjoyment and pleasure; while another regards it as a disagreeable, but not insuperable obstacle in the course of foreign travel. I hope that all the different sea lovers or haters will find a section for themselves somewhere in this book, but just at present we will deal with the fishy kind.

Now, fish is a very good thing in its way, and our mothers would probably grumble very much if they could no longer buy it at the shops; so, since there must be fish, there must also be fishers, and since our rivers and lakes could not afford us one day's supply, we must get our fish from the sea. For the waters of the sea are inexhaustible, although the fish have many more enemies in the depths than on the surface. The life-history of a fish is a very interesting and wonderful thing, but though men write about it, and rave about it, and pity poor Mrs. Herring for having half of her million eggs eaten up, and a quarter of her flourishing young family devoured before her very eyes, few men ever stop to think of that much more

interesting treatise which might be written on the life-history of a fisherman. In many cases it is not too bad a life, as the lives of the poor go. He is affected by bad seasons and bad weather, but so are agricultural labourers and labourers of other kinds. Provided his boat is stout and he is strong and well, and keeps a careful eye on the weather, the inshore fisherman is safe. He may catch little or nothing one day, but will make up with a good catch the next. But many and many of the fish we eat have been caught at the cost of a man's life, and are salted with the tears of widows and orphans. It's a cruel trade, the sea, and the hungry waves will wash a man overboard sooner than they will wash a living into his boat.

Fishing is divided into two main classes: first, what I will call inshore fishing, for want of a better term; and second, deep-sea fishing. The first class includes the men who live on shore and fish from small boats, pearl, and sponge fishers; while the second is composed of trawlers, sealers, whalers, and all the large company of men who go down to the sea in ships to draw a living from its waters. I have not much to tell you about the ordinary inshore fisherman. His life, indeed, is adequately summed up in the poem of "The Three Fishers", which you all know. Of course we do see old fishermen when we go to the seaside, yet hardly one of them but mourns a brother, son, or nephew drowned at sea. But the old fisherman, owning his boat and setting sail in the cool of the evening, returning next day with his catch, is not the man who supplies our tables with fish. He is fast dying out, and will soon be out-of-date, and of as little effect in the scheme of things as the farmer

who cuts his grass with a scythe, or the woman who weaves her own wool. He keeps himself, it is true, but he does little towards keeping the world at large.

I have already mentioned the importance of the herring in the Middle Ages, and the far-reaching result of the improved method of curing discovered by the Dutch. It was the herring which originally tempted the Germans to leave their inland towns and settle by the Baltic, and the herring trade flourished abundantly from the twelfth to the fifteenth centuries on the coasts of Scania, Rügen, and Pomerania, where not only were there herrings but salt springs ready to the hands of the picklers. At the end of that time the herring shoals again changed their course, and by deserting those shores made history for all Europe. Just as the herring had built up the German towns, so now it began to build up the Dutch, when, in 1425, the fish chose the German Ocean for a spawning ground in preference to the Baltic. Nowadays the herring fishery is dead on the coasts of Scania, and there are various reasons to account for the change of spawning ground. Herrings dislike noise and confusion, and with the increase of sea traffic withdraw to more secluded waters. When they did venture into the Sound it was for the purpose of hiding from the whales, but since these mighty rovers from Greenland have changed their feeding grounds the herrings no longer need to leave the North Sea.

It is curious that England apparently did not discover the great wealth of fish which lay in the ocean on her eastern coasts until recent years. Her seamen had ventured to the Grand Banks in quest of cod centuries before they began to make a practice of fish-

ing for herrings in the North Sea. The first men to think of doing so were not men of Yarmouth or Hull. It was in the beginning of last century that fishers from Brixham, in their tight little cutter-rigged boats, began to venture eastwards in their struggle for a living. Rye, in Sussex, was a long way from home, but they were not content with discovering the fishy properties of Rye Bay. Farther and farther east they went until they had proved the value of the seas off Harwich, Lowestoft, and Yarmouth, and the convenience of those towns for the sale of their catches. Many of the Brixham fishermen settled permanently on the east coast when they found how good it was, and conservative Lowestoft still trawls with sailing boats which only differ from those of the Brixham men in being larger and stronger.

Trawling and drifting are the two main methods of catching deep-sea fish. The trawl is a sort of flattened-funnel-shaped net, being widest at the mouth and tapering to a fine point, called the cod end. The framework to which the net is fastened consists of a heavy wooden beam, which forms the top of the opening; and two triangular iron "runners", which form the sides. The beam may be anything up to 50 feet long; the runners (which rest on the ground when the trawl is down) are about 5 feet high. The mesh of the net varies from about 4 inches at the opening to less than half that at the "cod end". The lower side of the mouth of the net (which is, of course, framed by the beam and the runners) is attached to a thick rope, a good deal longer than the beam, so that it sags as the trawl is dragged along and trails through the sand, disturbing the fine fat

THE START OF THE FISHING-FLEET

From the fine picture by J. C. Douglas, representing herring gigs off for the night.

soles and flounders, turbot and halibut, plaice and the other flat fish that delight to burrow therein. Up they come, with a fine flurry of indignation—flop, flop against the top of the net, which is quickly sweeping over them; and so into the pouch-like receptacle at the narrow end they are driven in hundreds, there to reflect on the peculiarities of "cod ends" and other fishy extremities.

The net is towed by a heavy cable or warp. One end of the warp comes from the steam winch on the trawler, passes over the "horse"—a stout iron girder athwart the deck—and so goes to the bridle of the trawl, some seventy fathoms down perhaps. Seventy fathoms—420 feet—sounds a lot, and the task of hauling in from that depth, even with a steam winch, is a very trying one; but so far as actual length of cable goes it is nothing compared with that used in long-line cod fishing. The boats engaged in this work sometimes have more than eight miles of line out. That length of line will carry nearly five thousand fish hooks, and often takes as many fish as a trawl.

Trawling was practised first either at Brixham or Barking in Essex. Both places claim the honour, but it does not really matter to us which of them deserves it. Then, as now, ships trawled in companies, under the command of an admiral. Sometime between the years 1830 and 1840, a fleet fishing round the Dogger Bank was split up by a gale, and one boat was blown far away from its companions. The skipper, not knowing quite where he was, sounded, and found a depth of water much greater than he expected, for, as you know, the North Sea is shallow.

Deep places are much favoured by soles, particularly in cold weather, so the skipper shot his trawl in the hope of catching some, and to his delight and astonishment, his trawl absolutely filled up with the finest soles. This hole was nicknamed the Silver Pit, and frequently yields very large catches, but it has never repeated the phenomenal performance which began its career as a fishing ground. Its discovery, however, led to the establishment of a fleet of trawlers at Hull, and, more important still, to the rise and development of Grimsby.

In the time of Edward III Grimsby was a port of some renown, but, with the usual indifference of people in the Middle Ages, its harbour was allowed to silt up and become useless. After the discovery of the Silver Pit, however, people began to think Grimsby was worthy of notice. Trawling was profitable from Hull, so why should it not be tried from Grimsby, which is some miles nearer to the open sea? Chiefly by the instrumentality of the Manchester, Sheffield, and Lincolnshire Railway, which afterwards bourgeoned as the Great Central, the harbour was cleared out and the building of docks was begun in 1849. To-day the docks cover an area of 350 acres and receive about 3000 vessels a year. The fish companies of Grimsby send fish all over the country and contribute a most important addition to our food supplies.

Until recent years trawling was carried on entirely by sailing boats. To begin with, each boat worked independently of the other members of the company, although belonging to the same owner and controlled by one "admiral", and iced its own catch day by day;

this method being still followed by the Humber, Scarborough, and Tyne fishermen in winter. But the demand increasing, and with it the owners' desires, a new arrangement was begun at Yarmouth, by which the smacks stayed at sea in summer for six weeks at a time, and sent the day's catch to a "cutter", the fastest boat in the fleet, to be carried to shore. This was an oppressive innovation from the men's point of view, but worse was to come. It was not to be expected that Yarmouth would keep the monopoly of a system which was so profitable. The other ports followed, and the term of "fleeting" was gradually extended to three months; and in 1880 the trade was revolutionized by the introduction of steam trawlers. The steam certainly lessened the labour of heaving up the trawl, working the capstans, and so on, but in exchange much more was expected of the fishermen. The fleets had greatly increased in size, so that one morning's catch would fill the cutter. But worst of all, the owners began the practice of winter fleeting. Yarmouth was the ringleader in this inhuman invention, and Lowestoft copied her. Hull and the Humber ports held out for a few years but eventually surrendered. Grimsby was more stubborn, and her winter fleeting is still in its infancy. The more northerly ports have refused flatly to entertain the idea, which is indeed a barbarous one. Think of it—a hundred miles from shore in a little, wet, draughty boat, afloat on the heaving, tossing North Sea!

"Went down with all hands", is a common enough report in the winter fleeting season; so common, in fact, that the outside world hears nothing of it. But without paying the extreme penalty the men engaged

in the trade suffer more than enough. Mr. J. E. Patterson, in an article entitled "Life on the Dogger", in the *Graphic* for 14th March, 1913, describes it thus:—

"The men (the 'second hand' . . . and 'third hand' of each vessel) are going through the regular morning hardship of putting their night's catch aboard the 'cutter' . . . When the haul is made, the fish are at once gutted, washed, boxed; then out goes the small boat—one of the very boats that have gone scores of times in gales to the rescue of merchant seamen, principally Scandinavians, when their vessels were going down under them. Into the boat the boxes go, received and stowed by the third hand, to whose company the mate instantly jumps. Off the line is thrown; the oars go out; the deep-laden boat is swung about, as she clears the smack's lee-counter, and away she goes straight before wind and sea for the cutter. Meanwhile the skipper bears up and runs for a berth as near the lee-quarter of the cutter as circumstances and safety will allow—which, if he happens to be late, may be a mile away—there to lie till the boat returns, when, in most cases, all hands go to breakfast. And of all the bitter, dangerous, dirty, inexcusable work in this world the worst is surely 'boarding the cutter'. Yet, blow high, blow low, hail, rain, or thunder, it has to be done every morning —within certain limits of what circumstances man's greed and illogicalness have rendered as 'reason'—in order that the fish may be iced down at once, and by early afternoon can be on its way, throbbing, wallowing, sweating, to market."

With the introduction of steam the industry naturally underwent considerable changes, which have

been effected also by the improved methods of refrigerating and cold storage. It is no longer necessary to catch fish near at home and steam straight away to market with it. In fact, the North Sea, rich though it still is, cannot supply us with all the fish we need. The Brixham trawlers keep to the west and scour Mount's Bay, Cardigan Bay, and the Bristol Channel; while the Atlantic trawl fisheries, worked by British companies, send their boats as far as the Bay of Biscay and the Morocco coasts; the northern seas, however, still maintain the lead in production. But the steam trawlers soon found this ground too small for their operations. The Faroe Banks, which had for long given support to "line" fishermen, were invaded by the trawlers, and in 1892 they penetrated as far as Iceland, while in 1905 a Hull skipper rounded the North Cape and commenced the branch of the industry now known as the White Sea fisheries.

Fish caught by the trawlers include cod, halibut, haddock, soles, plaice, whiting, conger, skate, turbot, hake, brill, and ling. You will notice that the fish that is perhaps more important than any other, the herring, is conspicuous by its absence. Herrings are a class apart, having habits as distinctive as salmon, and even less understood. Little as we know about them, we do know that they congregate in vast shoals for breeding purposes, and it is at these times that the herring fishery is carried on. For hundreds of years past they have kept to the same spawning-grounds at the same time. Thus, in May they appear off the Shetland Isles, a little later off the north of Scotland, in August off Yorkshire, in the autumn off Norfolk, whence they disappear about Christmas. As the

shoals move in the sea, other shoals move on land, but shoals of a different character, whose movements are contingent on those of the herring. I mean the vast army of merchants and curers, cleaners and packers. If you visit any of the east coast herring ports at the right time of year, you will meet crowds of Scotch "lassies" who travel up and down the coast in accordance with the times and seasons of the herring shoals. You will see the results of their visits, too, when you look on the great fields, not green but brownish-grey, covered with lines of drying herrings. Pilchards, mackerel, sprats, and "sardines" are caught by the same methods as herrings, that is to say, by a large drift net, into which the shoals are driven so that the fishes are enmeshed by the gills or dorsal fin. The sardine, about which there recently has been such a complicated verbal war, is simply an immature pilchard. It is caught by means of fine nets dyed dark-blue, and enticed towards them with handfuls of salted cod's roe.

The herring fisheries support a great number of men and women, but a still larger number is engaged in cod fishing and curing. We still catch this useful fish in the places where our Elizabethan forerunners caught it, that is to say, off the shores of Labrador and Newfoundland.

A story is told of a learned judge who, in the course of hearing a dispute about the fishing rights in a small harbour, Tub Harbour, in Labrador, whispered to counsel, "Where is Labrador?" The counsel immediately replied, "In Tub Harbour, my lord." I hope you know better than that, but if you don't, please turn to your map of North America, and find

the exact position of this important country. It is a big place, as large as Great Britain, France, and Austria put together, so we have no excuse for ignoring it, except the very lame one that the rest of North America is so vast that Labrador is only a little corner piece, with no towns and only a few rivers and lakes marked on it. There hardly could be any towns, seeing that there are only 6000 permanent inhabitants. It is a bare, bleak land, of which the only animal wealth is fish, and the only vegetation forest trees of the hardy sort, such as firs and birches. The interior of the country has never been properly explored, and is occupied only by bands of wandering Cree Indians.

You remember our old friend Eric the Red? He it was who exploited the charms of Greenland, and, by virtue of the name, persuaded his fellow-countrymen from Iceland to migrate there. The same commercial instinct led him to give to the inhospitable shores of Labrador the poetic name of *Vinland*, or Wineland, thereby inducing a number of his friends to sail with him to the new country. So far from finding wine there, they were reduced to eating "fetid whale", which made them all ill. Certain it is that no easy living is to be found in that land of ice, fog, and cruel rocks, where the summer is made noticeable less by warmth than by clouds of mosquitoes and black flies. It is said to-day that no single man can support himself in Labrador. The Eskimos and natives of the coast are dying out, and the white settlers and Indians can only keep the wolf from the door if they have strong sons to help them, and a good outfit of guns, nets, traps, and boats. Even so, the wolf is only waiting; he is there, ready to devour the whole family

if bad weather or sickness will come to help him. Be they never so thrifty and careful, the settlers can make but the barest of livings. Anything like wealth, or what we consider comfort, is unknown. Yet these men are bound to the cold shores by ties of habit and fatherhood, and rarely leave them for more favoured spots.

Newfoundland is in rather a better position. In some districts the soil can be cultivated profitably, and the forests provide material for saw-mills and paper works. Although many people only think of it as the place where the dogs come from, we are indebted to it for many more things. Canned salmon, canned lobster, and large quantities of pickled herrings all come from Newfoundland, while another great industry, that of seal catching—which I must mention with more detail later on—also is carried on there. The island was discovered by John Cabot in 1497, for which service he received the totally inadequate payment of £10. About 30,000 fishermen from Newfoundland go every year to the Labrador fisheries; others fish off the shores of the island; and others go to the Grand Banks. Rudyard Kipling's fine story *Captains Courageous* will give you a much better idea of life on the Grand Banks than I can, and is a book every boy should read, and read again; but I must just tell you what the Banks are.

They are really submarine plateaux lying to the south of Newfoundland, and are about 600 miles long and 200 wide. They rise to a height varying from 100 to 600 feet below the surface, and you will learn from *Captains Courageous* what an all-important thing his lead is to the skipper of a fishing boat. It is his

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TOILERS OF THE DEEP

From the fine picture by W. Thomas, representing men hauling in the great seine net.

finger-post, his directory, his guide to the fish, his light in a fog. The cod are caught from small boats by means of lines and hooks. The load is then carried to the schooner, and at the end of the day is cleaned and salted. The catches of the shore fishers are cleaned and cured by women, 21,000 women workers being employed in Newfoundland. In the spring, when the cod is in shoals, it is caught with nets. The "cod trap" is an ingenious contrivance which is responsible for thousands of fish at a time. According to law, the traps may not be set before a certain day, and every spring, when that day comes round, there is a race to the best spots for placing the traps. Then, unless the trap is completely set within four days, the claim is invalid. Thus it often happens that a smart skipper may secure a good berth even though he were not first in the field. For instance, on one occasion a steamer was sent out, while the shores of Labrador were still ice-bound, with a number of trap-leaders in order to take up the best berths before the sailing ships could reach them. The "trap-leader" is the large net which must be put down to mark the claiming of a berth. But although the men put out the trap-leaders with all dispatch and intelligence, the remainder of the equipment never turned up until after the four days were over. Needless to say, there were by that time plenty of schooners waiting ready to profit by their competitors' dilemma, and the steamer's men lost all the good places they had claimed so proudly.

Another time, at the very beginning of the season, some men arrived with trap-leaders at a station late at night. They were very tired, and as there was not

a sail in sight, they decided to postpone their work till early morning. However, under cover of the darkness, two schooners came up and secured the good places which their rivals should have taken before going to rest.

The trap acts by virtue of the principle that cod, like sheep, always follow a leader. The vast shoals are inshore feeding on other shoals of caplin, which have come inshore to spawn. The leading net extends from a point of rock to the door of the trap about 150 yards away. The leader of the shoal, swimming lazily amongst the rocks, comes up against a net and turns himself into deeper water to avoid it. All his followers turn too, and so, without realizing it, pass through the door straight into the trap. The trap is an interesting place at first, for the net-walls are covered with slime and things delectable to the appetite of a cod, but presently it begins to feel overcrowded. At this point a shadow appears overhead, and the cod, looking up, see a boat above them and then a queer round thing coming through the water towards them. This is the fish-glass, through which the trapmaster is looking to see how the occupants of the trap are getting on. If he thinks the trap full enough the nets are pulled together, so that the door shuts and the mass of heaving, struggling fish is quite close to the surface of the water. Alas for inquisitive fishes! One after another, leader and followers alike, they are shovelled out and thrown into the bottom of the boat. When the boat is full, the surplus of the catch is put into bags, which are buoyed and "left until called for".

Catching by the seine also brings in huge returns.

You may see fishermen using the seine at various places on our own coasts. It is a very large net—in Labrador often 600 feet deep—and may be used in two ways, one of them being to draw it across an inlet, thus enclosing the fish on four sides. More often it is dropped right round a shoal in deep water. The great net is piled upon the stern of the boat, while the seinemaster, with his fish-glass ready, stands high on the bow. The boat is rowed slowly along until the seinemaster, seeing through his glass a shoal on the bottom, gives the order to "hold her up". Then the net anchor is dropped and the eight pinewood oars drive the boat swiftly round the shoal and back to the starting-point, which is marked by a brightly-painted buoy. The net is drawn in and the fish loaded on to the boat, or into bags, as before.

On the Banks, or late in the season, nets are of no use, and the fish are caught by lines. This method introduces the subject of bait, which has caused so many disputes and so much legislation. Bait is often difficult to obtain in deep water, and as a rule several boats club together to maintain a bait boat, which travels backwards and forwards between the bait grounds and fishing stations. The "Bait Act" passed by the Newfoundland government made the selling of bait to the French illegal, with the object of killing their bank fishing, but unfortunately the greatest result of the law was to deprive those who had depended on bait-selling of their livelihood. Cod are a fastidious fish, and do not care for morsels that are out of season. Mussels or whelks will tempt them, though mussels are really too soft and

can often be picked off the hook. It is possible to catch cod without bait by "jigging" a piece of lead up and down a few inches from the bottom, but this is not a good plan, as so many fish escape wounded and drive away their companions.

Octopus and squid are excellent bait, but the catching of them is attended with considerable difficulty and danger. In fact, it is rather surprising that cod should prey upon such well-protected creatures, and it can only be possible for them to attack successfully the young ones. The octopus and his relatives, the squids, grow to an enormous size in these northern waters, and in addition to their great evil arms, ready to catch and crush anything, they have powerful means of defence in the nasty black liquid they squirt over their enemies.

On one occasion two men from Newfoundland were out fishing, when suddenly from the water appeared two enormous arms which seized their little boat and began to drag it under water. I should not have been able to tell you this story if there had not happened to be a chopper in the boat, with which one of the men vigorously attacked the horrible tentacles, finally succeeding in chopping them off. Sheets and showers of the black ink covered the boat and half-blinded its occupants, but the monster sank out of sight and out of reach, after losing his two arms. These grisly mementoes of his visit are now to be seen in the St. John's Museum, and measure 19 feet in length. This is by no means an extraordinary length for octopus tentacles, which sometimes have been found to measure as much as 30 feet. Yet, we are told, and fortunate are we that it is so, "by

nature they are timid, lurking animals, the conger eel and other voracious fishes being their most formidable foes". A trap is used to catch them for bait, and the flesh is occasionally used for food.

Now, we have spent time enough in the cold north seas. By way of contrast, let us take a little voyage of a few thousand miles and visit the pearl fisheries in the warm waters of the southern hemisphere. Pearls are to be found in the Southern Pacific and the Persian Gulf, but the most important pearl fishery is off the coast of Ceylon, in the Gulf of Manaar. These waters have been fished for pearls by the natives for 3000 years, and the same primitive methods are still the favourite. The fishing lasts for about a month, between March and April, and attracts thousands of people from all parts of India, so that a temporary city of huts roofed with palm leaves springs up to accommodate this army of spectators and speculators. As the time grows near, the water is covered with boats of all weird kinds and shapes, waiting for the signal gun which gives the command to swarms of naked divers to plunge into the water. Most boats carry ten divers, of whom five work while five rest. The work is very exhausting and has to be carried out very rapidly. No doubt you have heard tales of divers who can remain under the water for fifteen minutes; but don't believe them, they are not true. Four minutes is the utmost possible time during which a man can be under water, but the best divers never attempt more than eighty seconds. The majority of them return to the surface at the end of sixty seconds. Even so, their eyes are bloodshot and blood pours from the mouth and nose. Their

only equipment is a heavy stone, about forty pounds in weight, a net, and a line attached to the boat. When they have been down long enough they pull at the rope and are hauled up rapidly. The waters are infested by sharks, but the noise and bustle attending the diving operations keeps them at a distance, and it is rarely that a shark attacks a pearl diver.

The Australian pearl beds lie so deep that the calling of pearl diver becomes a dangerous and disastrous one. "Diver's palsy", a cruel disease, carries off life or limbs after only a few years' work. This is a preventable disease, as our own Deep Water Diving Committee has proved, but the prevention entails time and labour, which, we must suppose, the North Australian pearl-fishing companies will not expend. A diving dress, as you know, is filled with compressed air, and when a diver is breathing compressed air he absorbs an excessive amount of nitrogen. If he is lifted straight from a great depth to the surface and taken out of his dress, this nitrogen disperses itself through his body in the form of bubbles. These bubbles may congregate round the heart and cause instant death; they may paralyse a nervous centre, or they may simply lie in the blood and tissues, giving rise to strange pains. All this distress may be avoided, however, by raising the diver gradually, allowing him to stop and rest several times in the course of his upward journey, thus accustoming him to a change of pressure. By this means the nitrogen has time to find its proper place in the diver's internal economy, and no danger from bubbles results.

Distinct from fishers of all other kinds is the sponge fisher. The valuable industry of sponge fishing is carried on extensively in the Gulf of Mexico, the head-quarters being Key West. The sponger, who is nearly always a "Conch", or native of the Bahama Islands, may work from a well-equipped schooner, or he may be afloat, with only two companions, in a tiny boat 100 miles from home; but in any case he is happy. The Gulf is frequently swept by heavy storms, but coral reefs and islands afford plenty of shelter, as do also the curious springs of fresh water which bubble up to the surface, for in these fresh-water patches the great seas do not break. In all calm weather the little boats may be seen drifting through the water, one man in the bows paddling gently with an oar, the other leaning over the gunwale staring into the depths through a water-glass. A bottle of oil is hung out over the bows, and by dripping slowly smooths every ripple which might obstruct the view of the watcher.

"Loggerheads" are passed by in disdain, though it would puzzle you or me sorely to tell the difference between a loggerhead and a "sheep's wool" or "grass" sponge. When the watcher sees the proper kind he does not take his eyes from the water-glass, but just moving his hand he lifts his hook, a little tool on the end of a handle some 60 feet long, and lifts his quarry from the ocean floor as easily as you can pick up your boot. If you know anything about the refractive power of water you will realize what a lot of practice is needed for such a feat. If you do not, find out about it by trying to strike at something with a stick at the bottom of a pond, or even by

looking at your own hands as they lie under water in the bath.

When the little boat is full, her load is transferred to the bigger boat and left on the deck. It was always a slimy load, and in an hour or two it becomes a smelly one—so smelly, in fact, that ships two miles off are aware of the proximity of a sponge boat. But the spongers do not care; no, not even if the catch overflows the deck and has to be stored in the cabin. Smell to them is a familiar, homely thing; and since fresh air means mosquitoes, they shut up every window and cover themselves with sheets of calico, and sleep as soundly as they would in the most hygienic of our modern hospitals.

The sponges are stored in a kind of pen, which the sponger builds of wattles in shallow water as soon as he has gathered too many sponges to keep on the schooner. The sponges lie and rot in the "crawl", as it is called—whether from the crawly nature of the contents or by a corruption of "corral" I do not know —for several days, and are then taken out and beaten until all the animal matter is dispersed. After this they are washed and strung in bunches, being then placed on the beach to dry in the hot sun. When the drying process is finished the sponges are reduced to about a tenth of their original weight, and can be infinitely pressed down, so that a very large and valuable cargo can be stowed away in the hold of a small schooner.

If the tales of travellers are to be believed, the Key West spongers lead a blameless and enviable life. The summer seas in which they sail provide them with a sufficient livelihood. They are truthful, decent,

and sober, and, above all, intensely religious. Church-going is to them the highest form of pleasure, and they express their most boisterous feelings by singing hymns. Mr. Kirk Munroe, in an entertaining article in *Scribner's Magazine* some years ago, tells the following amusing little story:—

"On one of the uninhabited keys stands a large shed-like building. . . As I ran towards it one dark night last winter I was puzzled to account for a tremendous racket inside the old building. It sounded like a riot or a free fight at least, and, to satisfy my curiosity concerning it, I took the skiff and rowed ashore the moment our anchor was dropped. No light was visible until I was close beside the building, when I saw that a small area of its cavernous interior was dimly illumined by a single lantern hung just within the doorway. By this uncertain light a score of spongers, full-grown men, wearing palmetto hats as broad-brimmed as a Mexican sombrero, calico shirts, and jean trousers tucked into great cowhide boots, were playing tag. It was a genuine romp, such as would have been enjoyed by any boy of ten years, and the noise they made could be heard for miles out at sea. The moment they detected my presence the game came to an abrupt ending, and they gathered breathlessly about me to inquire if I were the new preacher who, they had heard, was coming up the reef. They were greatly disappointed to find that I was not a preacher, and after a half-hour of conversation I fell low in their estimation by asking why they could not have a dance, as I noticed that one of them had a mouth-organ and another a violin. Several at once hastened to assure

me that their preacher did not allow them to dance; while the owners of the musical instruments disclaimed an ability to play anything except hymn tunes. So I asked them to play some of those; and of all lugubrious musical performances I ever heard, I think the long-drawn wailings of those two instruments, attuned to sacred melody, was the worst. During the progress of the concert one of the tag-players took occasion to confide to me that 'Hi fer one don't see no great 'arm in dancing, seeing has Hi was borned and brung hup a Puseyite; but Hi'm the onliest one 'ere has his'."

We may be apt to think of fishermen as an unintelligent class, men of peace rather than war, and therefore of little account in the story of the conquest of the sea. But we must not overlook the fact that the quest of fish has led large numbers of men to sea who would never have gone merely in search of adventure, as did the vikings, or, like the Elizabethan sailors, in pursuit of treasure and fame. We have seen how, long, long ago, the herring made history, and how in the sixteenth century men who learned seamanship in voyaging to the Grand Banks took their courage and endurance to the West Indies, and passed on their splendid fighting qualities to posterity. We cannot calculate how much our present generation of sailors owes to the fishers of the past and, indeed, of the present, while it is certain that scientists and naturalists have to thank the fishing industry for many of their discoveries. Loosely controlled as our deep-sea fisheries are, yet the Government does realize that certain steps must be taken to guard against the extinction of our edible fishes, and various com-

missions and expeditions consequently have endeavoured to learn something about the ways and habits of these valuable creatures. Naturally none of these investigations has confined its efforts solely to edible fish, and many of the wonders of the deep have been discovered and examined by members of a fisheries commission. No one science is independent of another, so that in this way geologists, chemists, biologists, physiologists, and all the other "ologists", have been benefited. And what you yourself owe to the fisheries you probably will not realize until you are a family man, and your wife tells you that bacon is too dear to have every day for breakfast, and you really must try to eat kippers!

It is hardly fair, however, to close a chapter upon fish without some mention of the swarming millions of creatures which live in the sea, and are never, or rarely, used for food. I say rarely, because it is not possible to say definitely that any one fish has never been eaten. Shipwrecked sailors will eat anything they can catch, and on a long voyage many fish which are not exactly delicate form a welcome change from the eternal diet of salt beef and salt pork. But interest in and knowledge of the creatures of the sea is dying out amongst sailors. The bustle and noise of a steamship frightens away the inoffensive fishes that would accompany a slow-going sailing ship for miles. Sharks are not dismayed, but to a shark the shadow of a ship means food. The shark is a greedy beast, but he is timid, and his peculiar build prevents him from preying upon smaller fish to any extent. Therefore he follows a ship which is constantly flinging upon the waters morsels which appeal

to his sense of the agreeable. He does not prefer man-meat to any other, as is sometimes urged against him, but no doubt he welcomes it. A man, dead or alive, is as satisfactory a meal as can be had, unless a whale happens to be obtainable. There are many other fishes, however, that seem to follow ships less from greed than for companionship. Voyagers in sailing ships tell tales of shoals of little "rudder-fish", a kind of caranx, which cluster round the rudder of a ship which is travelling slowly. The shadow of the stern gives them protection from dolphins and their other enemies, but since they can make no great speed through the water they are left behind as soon as a breeze springs up.

Another ship's companion is the remora, a small kind of shark. This little gentleman is lazy and timid, and, moreover, very poorly supplied with teeth, so he has developed an arrangement of suckers on the top of his head, by which he can fix himself to anything so tightly that he cannot be pulled away, though he can unfix himself in a moment. By this means he places himself in any position which promises a fairly constant food supply; for example, the keel of a ship. But his most profitable place, and one in which he is most comfortable, is the palate of a shark! This engaging little habit of his, however, in certain countries proves his undoing, and he is made to work for his living. Wherever turtles and the remora abound the natives fish for the latter, and then harness him with a brass ring and a long fine line. Then they consign Mr. Remora to the sea once more, knowing that before long he will attach himself to a turtle, as they keep him away from the bottom of the boat with

the help of a bamboo pole. The rest is easy. As soon as the remora is firmly fixed to a turtle the man in the boat hauls his line in, and, notwithstanding all his struggles, the turtle cannot get free.

Only those who have spent days and hours on the warm, still waters of the tropical seas have any idea of the wonders contained therein. During a period of calm fish from the depths will often come to the surface. Possibly in the near future the submarine, as prophesied by Jules Verne in *Twenty Thousand Leagues under the Sea*, will be utilized to observe these creatures in their natural haunts, but until that day arrives we can have little knowledge of them. The late Mr. Frank Bullen, in his *Sack of Shakings*, records his meeting with one of these deep-sea folk:—

"One especially I tried to inveigle by various means, for I thought (and still think) that a stranger fish was never bottled in any museum than he was. He was sociable enough, too. I dare say his peculiar appearance was dead against his scraping an acquaintance with any ordinary-looking fish, who, in spite of their well-known curiosity, might well be excused from chumming up with any such 'sport' as he undoubtedly was. He was about 18 inches long, with a head much like a gurnard, and a tapering body resembling closely in its contour that of a cod. So that, as far as his shape went, there was nothing particularly *outré* in his appearance. But he was bright-green in colour—at least, the ground of his colour-scheme was bright-green. He was dotted profusely with glaring crimson spots about the size of a sixpence, and from the centre of each of these spots sprang a brilliant blue tassel upon a yellow

stalk about an inch long. All his fins—and he had certainly double the usual allowance—were also fringed extensively with blue filaments, which kept fluttering and waving continually, even when he lay perfectly motionless, as if they were all nerves. His tail was a wonderful organ, more than twice as large as his size warranted, and fringed, of course, as all his other fins were, only more so. His eyes were very large and inexpressive—dead-looking, in fact—reminding one of eyes that had been boiled. But over each of them protruded a sort of horn of bright-yellow colour for about 2 inches, at the end of which dangled a copious tassel of blue that seemed to obscure the uncanny creature's vision completely.

"To crown all, a dorsal ridge of crimson rose quite 2 inches, the whole length of his back being finished off by a long spike that stuck out over his nose like a jib-boom, and had the largest tassel of all depending from it. So curiously decorated a fish surely never greeted man's eye before, and when he moved, which he did with dignified slowness, the effect of all those waving fringes and tassels was dazzling beyond expression. I think he must have been some distant relation of the angler-fish that frequents certain tidal rivers, but he had utilized his leisure for personal decoration upon original lines."

CHAPTER V

Whaling and Sealing

I HOPE you know, without being told, why I have not mentioned whales in the last chapter. It would be truly a shocking thing if you thought that a whale was a fish. True, it lives and swims in the water, and feeds on marine creatures, but there its fish-like characteristics end.

A whale is hot-blooded as you are, it came into the world in the same way as you did, and it is as dependent on a sufficient supply of oxygen, without which it would die, as you. If for any reason a whale is prevented from coming to the surface to breathe, it drowns. Clearly it is not a fish, for who ever heard of a drowned fish?

Whales are mammals, and they began their history ages and ages ago as land animals. As you know, all life originally came out of water, the first animal forms being marine reptiles which gradually developed other means of locomotion, such as wings and feet. We must think of the forerunners of all the sea mammals, the whales, seals, sea-lions, sea-cows, sea-elephants, walruses, and all their kindred, as great, sprawling antediluvian animals roaming about on their four disproportionately short legs, readily taking to water, but having their home proper on land. One day, then,

a tribe of these ungainly creatures, which naturalists to-day call Zeuglodonts, went to sea, and for some reason never came back. No doubt they had prepared themselves for the great change by taking longer and longer voyages from generation to generation—I am not suggesting that they went suddenly—but, finally, they cut themselves off for ever from a life on land. This tribe thenceforward became the whale family. The short fore legs were reduced to fins, though under these fins may still be detected four or five fingers, but the hind legs were dispensed with entirely.

Whales to-day are classed under two distinct headings, very easy to remember. I will not trouble you with the Latin names, but if you want to learn them you can find them in any encyclopædia. We will call the two classes simply whalebone whales and toothed whales. The first class, also called Baleen whales, includes the Rorqual, the Right Whale, the Arctic Right Whale (sometimes called Greenland Whale or Bowhead), the Southern Right Whale, the Humpback, the North Pacific Grey Whale, and the small and rare Australian Whale that has no name simpler than *Neobalæna marginata*.

All these whales have distinguishing features, but they are all alike in having no teeth. Instead, they have a most wonderful arrangement of horny plates growing out of the palate and hanging down in the mouth like a curtain. These plates, which vary in number from 300 to 400, constitute the whalebone of commerce, although strictly they are not bone at all, but have more of the nature of hair. The whale swims open-mouthed through shoals of the little creatures

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Photo. H. J. Shepstone

THE SULPHUR-BOTTOM WHALE

This species is the largest of the whales, the one illustrated measuring no less than 80 feet. It is one of the toothless whales, possessing fringed plates of "whalebone" in lieu of teeth.

C766 Photo. Underwood & Underwood

WHALEBONE FROM BEHRING STRAITS

This is not a picture of a giant variety of Pampas grass, but of the baleen plates, or whalebone, from the jaws of the Arctic "right" whale. The whale has 300 or 400 of these plates hanging from his palate; they weigh a ton or more, and act as a gigantic sieve. The whale swims with his mouth open, and, when he has got a good mouthful, closes his jaws, lets the water drain through the sieve, and swallows what is left behind. Whalebone, which is more properly horn than bone, is worth about £2000 a ton.

which it loves to feed upon until its mouth is full. Then it closes its jaws, and the water trickles out at the sides, while the solid matter is caught on the whalebone, which thus serves as a sieve. As a big whale's jaws may be 20 feet in length, you will understand that a great deal of stuff will float inside, but it takes a great deal to satisfy the hunger of the gigantic stomach. These baleen plates form a valuable part of the captured whale, and although in these days of substitutes whalebone no longer fetches the enormous prices it used to command, it is still a commodity which is worth the trouble of getting.

In the eighteenth century whalebone was sold at £350 a ton. Then the price fell to £25 a ton, after which it steadily rose as the demand increased, till in 1892 it reached the tremendous figure of £2925 a ton. Since then it has fallen again, and now an average price is about £1300 a ton. You may think this sounds a great deal of money, but you must remember that half a ton is a reasonable amount to take from one whale, although it is true that very big whales may yield more than a ton. Baleen is not much used now. Formerly umbrella frames were made of it, but now steel wires are used for that purpose, and steel, vulcanite, and cane largely take the place of whalebone on account of their smaller price—not always because they are more suitable. Flue brushes and brushes for street-sweeping machines are still made from it, and in these cases no efficient substitute has been found. The price of whale-oil is also on the decline, for similar reasons. To-day whale-oil would never be used for lighting, and other oils have been found to take its place in other directions. In

fact, the palmy days of the whaling industry are over, and its profits are so greatly reduced that the number of ships engaged in it yearly grows smaller.

We must now turn our attention to the second class of whales, the toothed variety. These are much more numerous than their brethren of the baleen plates. The Bottlenose, the Beluga, the Common Porpoise, the Grampus, the Caaing Whale, and the Common Dolphin are all toothed whales, while two varieties, the Narwhal and the Cachalot, need special description. The narwhal is remarkable on account of its long tusk, which it uses in fighting and in breaking through the ice in the winter, to make blowholes and to keep them open. Sometimes a male has two tusks. The female occasionally has one on the left side of her head, but never two. The narwhal is persistently hunted for its oil no less than for its ivory, which is very fine, and as the herds often number some thousands of narwhals, it is not very difficult of capture. At Copenhagen, in the castle of Rosenborg, there is a throne of the kings of Denmark made of narwhal ivory. The cachalot, or sperm whale, though not the largest of the whales, often reaches a length of 60 feet. Its throat opens quite wide enough to admit a man's body, and it is said that a bull cachalot is capable of sinking a whaling vessel. On the top of the head is a large space in which is stored the spermaceti for which this whale is famous, while the very valuable substance known as ambergris is a secretion from its bowels. Ambergris is sometimes found floating on the sea, and is sometimes taken from the dead whale. In appearance it is striped like marble, and dotted all over with black

specks. These are the beaks of *Sepia octopodia*, which is the favourite food of the cachalot.

I have heard of a cachalot which, mortally wounded, disgorged the contents of its stomach, amongst other choice morsels thus brought to light being several pieces of cuttle-fish arm, 6 feet in length and 8 feet round. I am not prepared to swear to the truth of this story, nor to the statement made by a contemporary writer that a sperm whale will dive to a depth of 5000 feet below the surface of the ocean; but it may be so. At such a depth the whale would have to support a pressure of, roughly, 140 tons to the square foot. We know the whale to be a sturdy creature, but we may be forgiven for doubting that it is quite as stout as all that. Certain it is that the whale is equally at home in polar and tropical seas, and that it is enabled to support these changing temperatures by the thick layer of blubber which covers its body; and it has been suggested that this blubber protects the whale when it sinks to great depths.

Whales have been hunted for a thousand years or more. Probably our old friends the vikings were the first whalers, and they hunted the Atlantic "right" whale. In their footsteps followed the Basque whalers, and after them came the English and Dutch. Some one of these peoples, bolder than their fellows, first tackled the Greenland right whale, the largest living creature. A full-grown Greenland whale is 60 to 70 feet in length, and 30 to 40 feet round. Later on the valuable qualities of the sperm whale were discovered, and he, in spite of his fighting powers, was no longer immune from human attack. I say human, because whales of all kinds have their

enemies within the waters. They are never free from swarms of nasty little parasites called whale-lice, which sometimes cover them so completely that the black body is entirely covered by the white bodies. Seaweed and barnacles also attach themselves to whales, and it is not uncommon to see a whale with a seaweed beard and whiskers. But much more serious foes are sharks, sword-fish, and saw-fish, which, it is said, bite and saw great lumps out of the whale's body, their visits sometimes ending in a mortal combat, in which the whale is not always victor.

Man has reduced whale-hunting to a fine art, and rarely loses his life in the attempt to capture the monarch of the seas. The whaling vessel to-day is a wonderfully well-equipped machine. It is provided with apparatus for rendering down the blubber and storing it, as well as the spermaceti, while it carries a regular arsenal of fearsome instruments. The boats from which the actual catching is done are built sharp at each end. They are manned by a head-man, a steersman, and four rowers, and are provided with two lengths of harpoon line. When a whale is sighted one or two boats hastily leave the ship and make towards their quarry. At this stage of the proceedings silence is of the utmost importance. Whales have poor eyesight, but their hearing is acute, while they have a sixth sense which warns them of impending danger—a sense against which man can take no precautions. Very, very carefully the boat approaches the unconscious mass: oars are discarded as too noisy, and sails or paddles are used instead. The last few moments are tense with anxiety. If all is well, the harpooner stands and, as the boat glides

right up and on to the heaving monster, hurls the harpoon with a shout of triumph. Sometimes he does so, at least; but nowadays the harpoon is often fired from a gun, which, owing to its greater range, has obvious advantages in point of safety. It would appear, however, that the advantages may extend to the whale, for it is said that harpoon-guns and bomb throwers are less certain in their aim and execution than the hand-thrown harpoon in expert hands.

Now follows a period of suspense. The boat must be backed away as cautiously as it approached unless the creature is a bull cachalot, in which case the wise whaler gets out of reach as soon as possible. But a whale of ordinary temper will feel uneasily the prick of the harpoon in his body, and after a short period of meditation on the subject sink down to try to get rid of it. He may remain below the surface for any length of time up to forty minutes, during which the crew of the boat must be constantly on the watch. At any minute there may be a sudden rush on the part of the whale, and then woe betide the crew that did not notice the flash of his huge flukes just under the water: men will be carrion and boat will be matchwood in less time than it takes to write unless the angry monster is fought with the utmost presence of mind.

But if the boat is skilfully handled, his attacks can be parried until, out of patience, he sets off with the boat in tow. Then follows the wildest dance through the waves at a speed of twelve or fourteen knots an hour, harnessed to Leviathan, who longs to be free, and yet, with all his great strength, cannot rid himself of that worrying prick in his side. His great speed soon tires him, too, and he slows his

pace sulkily, not knowing that as he does so the boat full of his enemies is creeping closer and closer to him. At last it is upon him, and the cruel lance, wielded by an experienced hand, enters his body just below the pectoral fin. One well-aimed stroke from the lance is the beginning of the end, but the hunters generally make doubly sure and stab the exhausted whale again and again. Soon blood is seen issuing from the blow-holes, showing that death is imminent, and nothing remains now but to wait for the struggles to cease and to tow the prize in triumph to the ship. The rorqual, who is more full of tricks than a bag of monkeys, does not cease even at death to trouble his captors, for directly life is extinct he sinks. Many devices are used to overcome this quality of his, such as strings of inflated bladders attached to the line. Rorqual-hunting is a modern idea, for rorquals are of little value commercially; but their wiliness and cunning make them desired of sportsmen, and the hunting is a dangerous business, calling forth absolute sang-froid and expert seamanship.

When the buoyant dead whale is safely fastened to the ship the work of securing the blubber—flensing, as it is called—is begun. The following account of this operation is given in Sir William Jardine's *Naturalist's Library*:—

"The huge carcase is somewhat extended by strong tackles placed at the snout and tail. A band of blubber, two or three feet in width, encircling the whale's body at what is the neck in other animals, is called the *kent*, because by means of it the whale is turned over or *kented*. To this band is fixed the lower extremity of a combination of powerful blocks,

called the *kent-purchase*, by means of which the whole circumference of the animal is, section by section, brought to the surface. The harpooners, having spikes on their feet to prevent their falling from the carcase, then begin with a kind of spade and with huge knives to make long parallel cuts from end to end, which are divided by cross-cuts into pieces of about half a ton. These are conveyed on deck, and, after being reduced to smaller portions, are stowed in the hold. Finally, being by other operations still further divided, the blubber is put into casks, which is called 'making off', and packed down completely by a suitable instrument.

"While this flensing is proceeding, and when it reaches the lips, which contain much oil, the baleen is exposed. This is detached by means of bone hand-spikes, bone knives, and bone spades. The whole whalebone is hoisted on deck in one mass, when it is split by bone wedges into junks, containing five or ten blades each, and stowed away. When the whole whalebone and blubber are thus secured, the two jaw-bones, from the quantity of oil which they contain, are usually hoisted on deck, and then only the *kreng* remains—the huge carcase of flesh and bone, which is abandoned either to sink or to be devoured by the birds, sharks, and bears, which duly attend on such occasions for their share of the prey."

Nowadays whaling is as safe as any pursuit followed on the high seas can be, and whalers rarely lose their lives in the course of a voyage; but formerly it was a much more dangerous occupation. Less was known of the habits of the whale, the implements were crude and primitive, and the ocean was a lonelier

place. Whales were more plentiful, it is true, and a whaling skipper embarked on his voyages with a reasonable expectation of bringing home a valuable cargo, whereas to-day it is not infrequent for a whaler to return after a long voyage without having made a single catch.

But, on the other hand, whaling in the old days meant facing much hardship and real danger. In the warm seas there was the chance of calm, and in the cold seas there was the possibility of being imprisoned by the ice. Either case meant starvation. Again, the whale himself, as we have seen, might destroy boat and crew altogether, but no whale has much chance against modern harpoon guns and bomb guns.

Let me tell you a story of some Russian whalers who were stranded on Spitzbergen, about the middle of the eighteenth century. A ship with fourteen hands on board was sent out from Archangel, under instructions to make for the west coast of Spitzbergen, to hunt for walrus and whale. Unfortunately they could not reach the shore, the ship becoming fast in the ice while still two miles from land. Their position seemed hopeless, so four of the men, Alexis Himloff, Ivan Himkoff, Stephen Sharapoff and Feodor Weregin, were sent over the ice to the shore to look for a hut which had been built by the Russians for the benefit of sailors visiting the island. After a very painful and perilous journey across the ice they reached land and found the hut. By this time daylight was fading, so they spent the night very comfortably, sheltered from the wind which was howling and raging outside.

The next morning early they went out to signal to their comrades on the ship, but to their horror no ship was to be seen. The gale of the night had blown the ice away and the ship with it. Nothing was to be seen around them but glittering sea and stately, solitary icebergs. We may be sure that they realized at once the gravity of their situation. They had no provisions, and there was no likelihood that any other boat would pass near them until the following spring. But they were not wholly without resources. Expecting that the hut might need some repair they had taken with them from the ship an axe, a knife, a large piece of lead, a stove and kettle, and a piece of touchwood. They also had a gun and a little powder, and a very small bag of flour, while each man had a pipe and some tobacco. No doubt they allowed themselves to cherish a hope that the ship would make some port and send them relief in spite of the rigorous winter, but as a matter of fact she was never seen again, and must have gone down with the remaining ten seamen. However, they must have known full well that life would have to be supported meantime by their own efforts. At any rate they had shelter, and their first care was to patch up the hut and make it warm and weather-proof. They mended the walls with pieces of wood from a wreck which lay near by, filling the crevices with moss. In the middle of the largest room was a fireplace, having no chimney it is true, but none the less effectually warming the hut. The wreck and the driftwood with which the beach was strewn kept them well supplied with fuel, but the first and most pressing question was the food supply. How were four big men, with

only one musket and twelve rounds of powder, to maintain themselves on a barren land through five months of black winter night? Obviously arguing about it would not feed them, so they went out and hunted their dinner.

We often hear it said: "What would happen to a man of to-day, if he were suddenly bereft of all his possessions and left in the world empty-handed, to fight for his life?" I think he would probably die, unless he happened to be in one of those favoured localities where man's food and drink grow on the same tree. These Russians, as I have said, were not absolutely dependent on their two hands. They had an axe, a knife, and a fire, and for the present they had a gun and gunpowder.

But twelve rounds of powder will not last for ever, and when they were gone the Russians would have two horrible enemies to face—polar bears and starvation. They wisely determined to live as long as they could, and while they had their gunpowder (with which they killed in all twelve reindeer), they worked early and late with feverish energy to provide themselves with weapons for use when their gunpowder should be used up. They had no hammer, so they had to make one, a seemingly impossible task, since they had no forge, and since every hammer has been shaped by some other hammer. Here again their wreck served them, for on a piece of timber they found a large, heavy hook, having a little hole in it. They also found a big nail. Then by heating the hook, and working the nail round and round in the hole, they ultimately made the little hole a big one, that is to say, big enough to take a handle. Then they made a

kind of sledge of reindeer horns, with the help of which they moved a large block of stone from the shore to the hut. That made them an anvil. Plenty of bits of iron were to be found lying about the wreck, so that now, with hammer, anvil, fire and iron, they were fully equipped for blacksmith's work. The powder was sadly reduced by this time; clearly weapons must be their first care, so they set to work to make spears. First they forged spearheads from scraps of rusty iron, next they chose the least rotten pieces from the wreck to make shafts, lastly they joined head to shaft with reindeer fibres. Thus armed, two of our friends went out and killed a polar bear!

The polar bear, you may or may not know, is one of the most dangerous of animals when he wants his dinner. He is a great big fellow, often measuring 9 feet, while the strength of his arms is enormous. A blow from his paw might kill a man, certainly it would stun him and make him easy of dispatch. Yet these solitary Russians, having unlimited pluck and perseverance at their command, kept these cruel foes at bay with the help of their rough tools. It is said by hunters of the brown bear, a tame animal compared with his polar cousin, that if you waver you are a dead man. Presumably our heroes never wavered: at any rate they killed ten polar bears during the time they were on the island. The bears did not always wait to be attacked, but would march boldly up to the hut in the hope of finding an unwary man to feed upon. Then the sailors would try to frighten them away by shouting, but if that was of no avail the spears were brought out and the matter finally decided. The first bear they killed proved useful to them in a way they

did not expect. They ate him, of course, and very good they found him, and they dressed his skin, afterwards making it into a coat. But as it turned out, the most valuable product of their bear was one upon which they had not reckoned.

When they began to cut him up, they found his sinews were of an amazing toughness, and could, moreover, be divided up into cords of varying thickness. Thus they were not only provided with threads and twines, but a bow-string. A stout pine branch which they found amongst the driftwood made their bow, sea-birds gave them feathers for their arrows, which with the help of their forge they tipped with iron. As winter fell they wanted light. They made wicks from the cordage of the wreck, and their reindeer gave them plenty of fat for oil, but they had no lamp. They shaped a vessel from clay and baked it, but it was porous, and for a long time they could think of no way to remedy this defect. However, they had not many materials to experiment with, and in due course they stumbled upon the right one. By dipping their lamp into a thin paste made of a little of their precious flour and water, they rendered it perfectly "oil-tight", and thenceforward they had a continual light. Clothes they made from the skins of the various fur-bearing animals which they killed, using needles shaped from bones and pierced with the point of their inestimable knife.

So far I have only dwelt on the bright side of the experiences of these brave men, but the dark side of the picture has to be shown as well. Alexis Himloff, the boatswain, had left a wife behind at Meisen, and we can imagine him brooding and torturing himself at

the thought of his loss and her grief. Worse still, Feodor Weregin fell ill of scurvy. Now the other three had something to worry them indeed, for scurvy rarely confines itself to one member of a party. Moreover, though they were kindness itself to Feodor and nursed him as tenderly as a mother nurses a sick child, he was a querulous, desponding patient. That was depressing enough for the others, but when Feodor had died and they had carried his body out into the whirling snow, terrible thoughts came upon them. When the poor sufferer from a long illness is at last at rest, those left behind always feel as though their occupation in life is gone. No longer is there the invalid to tend and care for. Imagine, then, the case of these three poor survivors, in the midst of Arctic winter, with no possibility of going out for any kind of diversion for months! How they would begin to watch one another furtively and to examine themselves, dreading, yet fearfully expecting, to find symptoms of the disease! Who would be next? Worse still, who would be left last, to die alone? They had now been upon the island six years, and it is not to be wondered at if hope of rescue had left them. Yet just when things seemed so dark, help was on its way. A ship, coming to Spitzbergen for whales, happened by God's providence to make for the very spot on the coast where stood the hut and the occupants it had sheltered so long. The rest tells like a tale out of a story book, so happily is everything finished off. Their rescue and their extraordinary life on the island was made a matter of almost national importance and congratulation; Alexis Himloff's wife was waiting to welcome him on the quay as the boat approached

Meisen; while even the most materialistic of my readers will be satisfied to hear that the castaways returned home quite moderately wealthy, being laden with 2000 lb. weight of reindeer fat, ten bears' skins, and a great many deer and fox skins.

It is interesting to note—without any attempt at comparisons, which are odious, of two excellent nations—the far different fate of seven Dutchmen who volunteered to winter in Spitzbergen, intending to begin whaling as soon as the winter was over, more than a hundred years before the events which I have just related. These men were abundantly supplied with food, weapons, fuel, and everything needful for supporting life, but they lacked the training which enabled the Russians to hold their own. The Russians, accustomed from birth to fight against circumstances, only found themselves spurred and invigorated by the odds which faced them. The Dutch, on the other hand, brought up amongst law and order, in the shelter of whitewashed houses surrounded by tulip fields, were appalled at the desolation, the crushing, oppressive silence, and the blackness of winter. They allowed themselves to fall—or perhaps it would be fairer to say they could not prevent themselves from falling—into melancholy. Now in such circumstances melancholy would naturally lead to the discussion of scurvy, its symptoms and effects, then to the taking of antiscorbutic medicine, with which they were too plentifully supplied. The disease itself appeared in due course, and—need I tell the rest? This is an extract from their log of 26th February:—

"The four of us that are still alive lie flat upon the ground in our huts. We believe we could still feed

were there but one among us who could stir out of the hut to get us some fuel, but no one is able to stir for pain. We spend our time in constant prayers, to implore God's mercy to deliver us out of this misery, being ready whenever he pleases to call us."

When the ship came in June, expecting to find a cargo of blubber and whalebone waiting to be taken off, there was no sign of life around the huts. One man, running faster than the others, came first to the dwelling, and bursting open the door found the seven dead bodies lying in the one room. Three of them had been put into coffins, how painfully we can only dimly imagine: the others were lying on sails on the floor.

Sealing is a more important industry than whaling at present, but it is to be feared that if the existing method of wholesale slaughter is allowed to continue, seals eventually will become extinct, or as shy and scarce as whales.

The seal is an interesting animal. He is easily tamed, and makes a docile and affectionate, though somewhat clumsy pet. Stories are told of seals that have become so intimate with man that they will flounder into the house and lie by the fire with the cat and dog. But the mother seal has an especial claim on our sympathies, by reason of the great love she has for her pup, knowing it from amongst a thousand others, and fighting fiercely to defend it. Unfortunately baby sealskin is a highly-valued article of commerce, and the seal-hunter allows no sentiment to interfere with the ruthless killing of the pups. We have no quarrel with the humane slaughter of

seals for the sake of their oil, or to prevent their injuring our fisheries, which is undoubtedly a fault to be laid to their charge. But we must protest vehemently against the abominable methods now practised of disabling the seal and *skinning it alive*, simply to pander to the whims of rich women. It sometimes happens that there is not even that excuse, for once, at Unalaschka, at that time the chief station of the Russian fur company, 700,000 sealskins were thrown into the water, "in order not to glut the market".

A very different matter, however, is the lawful killing of seals for the purpose of human food. Not once, but many times in the history of Arctic travel, has the seal been the means of saving the lives of stranded seamen. Dr. Kane, who made a valiant attempt to find some traces of Franklin's expedition long after all hope of rescuing Franklin had been given up, tells a thrilling story in this connection. Reverses of fortune had crowded thick upon Dr. Kane. His dogs died of some infectious disease, and his men were all attacked by scurvy. At last the remnant of the party set out to row to Upernavik in leaking boats, but their efforts daily grew weaker. Starvation seemed at hand, when they saw a seal lying at a little distance.

"Trembling with anxiety we prepared to crawl down upon him. Petersen, with a large English rifle, was stationed in the bow, and stockings were drawn over the oars as mufflers. As we neared the animal, our excitement became so intense that the men could hardly keep stroke. He was not asleep, for he reared his head when we were almost within rifle shot; and to this day I can remember the hard,

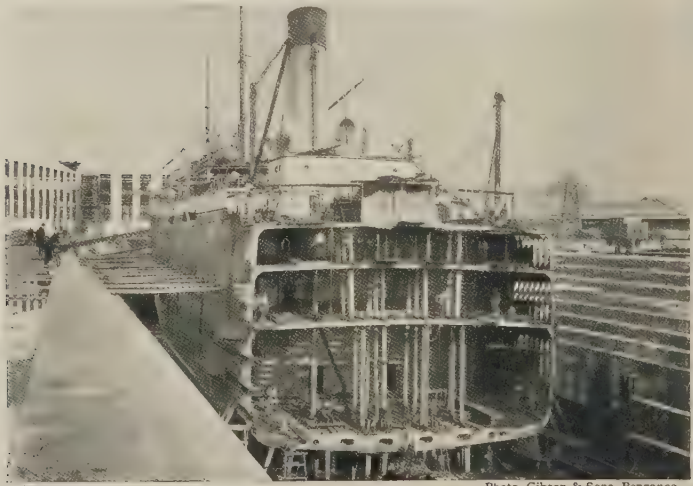

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Photo. Gibson & Sons, Penzance

A GREAT FEAT OF SALVAGE

When the *Suevic*, 12,500 tons, went ashore off the Lizard, it was found impossible to raise her whole. She was therefore cut in two with dynamite. The larger portion was made water-tight and taken to Southampton, where a new fore-part, built at Belfast and towed round, was joined on to it. The top picture shows the fore-part of the *Suevic* abandoned to the waves; the lower one, the salved after-part ready to have the new bows built on.

careworn, almost despairing expression on the men's thin faces as they saw him move; their lives depended on his capture. . . . The seal rose on his fore flippers, gazed at us for a moment with frightened curiosity, and coiled himself for a plunge. At that instant, simultaneously with the crack of our rifle, he relaxed his long length on the ice, and, at the very brink of the water, his head fell helpless to one side. I would have ordered another shot, but no discipline could have controlled the men. With a wild yell, each vociferating according to his own impulse, they urged their boats upon the floes. A crowd of hands seized the seal and bore him up to safer ice. The men seemed half-crazy. I had not realized how much we were reduced by absolute famine. They ran over the floe crying and laughing and brandishing their knives. It was not five minutes before every man was sucking his bloody fingers, or mouthing long strips of raw blubber. Not an ounce of this seal was lost."

Another very useful member of the family is the walrus or morse. His meat is excellent food, his hide makes weapons, and his tusks are serviceable in many ways. He is a big, strong creature, capable of killing a polar bear. He does not deliberately attack man, but will fight in self-defence, while the female will make a fierce resistance if she has her young one with her. Maternal affection is very strongly developed in walruses, and of this quality walrus hunters take a base advantage. They catch a cub whose mother has gone fishing, and then tease and ill-treat it until it grunts. On hearing it cry, all the father and mother walruses come up to the surface, and are quickly put to death.

CHAPTER VI

Beneath the Waters

It would be very unfair to leave out of our story the exploits of the men whose life-work takes them below the surface of the sea. The submarine workers are so deeply hidden from our view that we generally see and hear very little about them. But they do magnificent work, all the same—often very brave work—and have certainly contributed very largely to the scroll of sea conquests. Of course, the submarine boat has attracted a very great deal of our attention lately, but the submarine, so far, has confined its services to war. Some day—probably no very distant day—submarine navigation will be reckoned also amongst the more useful arts of peace.

Submarine boats are by no means a recent invention, although it is true that only in recent years have they been improved sufficiently to be of practical use. The conquest of the air and of the depths of the sea were dreams which filled men's minds centuries ago, and a boat that could travel under water has been a reality for very many years. I have no space to tell you here of the struggles, failures, and successes of the pioneers of submarine navigation, for the modern aspect of the subject alone is so intensely interesting that an endless chapter could be written upon it.

To begin with, I am afraid those readers who base their mental pictures of a submarine upon the *Nautilus* of Jules Verne's creation must rearrange their ideas. Up to the present, at any rate, submarines travel at no very great depths; as a rule, in fact, 300 feet is the average limit of submersion: and they are not provided, as was the *Nautilus*, with a powerful searchlight which illumines their watery path, for the simple reason that no suitable light can be produced. One of the great disadvantages of the submarine is its blindness under water. Many fatal accidents have occurred from this cause alone, for although the periscope, of which so much has been heard, is a wonderful instrument, it is of no avail when the submarine descends to depths below 18 feet from the surface. It is this blindness which constitutes the submarine's great fault in the eyes of its detractors, while Sir Percy Scott and his following, who predict that the perfection of the submarine will reduce super-dreadnoughts to anachronisms of a most expensive and undesirable kind, see in it only a difficulty to be overcome as soon as may be.

At present Great Britain is at any rate the equal of other nations as far as the efficiency of her submarines is concerned, while numerically speaking she is in advance of the world. At the beginning of the Great War we had 96 submarines, France 93, and Russia 43, while Germany and Austria together could muster only 53. Yet in the matter of submersible boats we followed our usual policy of "waiting and seeing" in the first instance. When other nations were busily employed in building and experimenting with submersible boats—France, at that time our bitter enemy,

leading the way—we stood aloof and looked on with, apparently, supreme indifference. "Great Britain rules the surface of the waters," said our leaders; "she has no need to adopt such sneaking methods." Indeed, many prominent naval men regarded the submarine as an inspiration too vile and obnoxious to be considered by honourable peoples. However, in 1901 we suddenly woke up. Perhaps, after all, we had not really been asleep all the time, but had been merely dozing with one eye open, and that one eye very keenly regarding the achievements of our neighbours. However that may be, in 1901 the Admiralty commissioned Messrs. Vickers, Maxim to build five submarines after the pattern of those designed by the American expert Holland. How our critics howled and raved! We were accused of copying—of which offence undeniably we were guilty—of stealing ideas, and altogether of behaving in a despicable fashion; but, looking at it from a dispassionate point of view, I am not sure that we did anything outrageous, since the same course was clearly open to every other nation which chose to adopt it. Certainly we scored, as we provided ourselves with a ready-made fleet of the newest type of submarines without having wasted any money at all in costly experimental work.

Holland I, as our first submarine was christened, had very few points of resemblance with the sinister boats of the E class of which we are justly so proud to-day. She was a little boat, being only 63 feet long, and proportionately rather bulky in girth, for the long, smooth lines which the E class boats display have been arrived at only after years of development. She

had a displacement of 122 tons when submerged, while it is whispered that our newest submarines, the F class, have a displacement of 1000 tons. But the *Holland I* brought immense pride and pleasure to us when she was launched, and she and her sisters taught our seamen and engineers invaluable lessons in the then new art of submarine navigation.

Let us examine in detail one of these wonders of modern invention and ingenuity. The most important factor to be considered is, of course, the method of propulsion, a factor that has presented itself as one difficult to solve. Our first submarines of the Holland type were driven by petrol engines on the surface, and by an electric motor when submerged. But petrol is a difficult thing to carry in large quantities. In such a confined space as a submarine affords, the slightest leak would mean grave danger of explosion. It used to be the practice, in petrol-driven submarines, for the crew to carry with them a cage of white mice. So long as the mice were quiet the men knew that all was well, but directly they began to squeak violently it was evident that the petrol was leaking and loading the air with poisonous and explosive fumes.

Electric motors also have disadvantages for submerged work. The batteries that provide the current are very heavy and take up a great deal of room, while if by accident they become wetted with salt water, the very poisonous chlorine gas is given off. Constant improvement of the type of battery used has minimized this danger very largely.

In our latest boats heavy oil engines are used for surface work, the same engines meanwhile working a dynamo and storing electricity for use below the

surface. These engines, with their stores of fuel and storage batteries, take up a great deal of room; in fact, if you were given an empty submarine and the necessary machinery for working it, I am sure you would find it worse than any Chinese puzzle to fit the one into the other. It reminds one, rather appropriately, of the famous story of the apple dumpling, and probably the answer is the same; but the building of submarines is carried out with the greatest secrecy, and it is quite impossible for anyone but the men employed on the job to tell you how it is done, and they are sworn to silence.

The oil engines and electric dynamo are, however, but a small part of the equipment of a submarine. The work of a submarine is to fire torpedoes, which are discharged from tubes by means of compressed air. The air compressor also provides life for the men on board, a detail I almost forgot to mention. Then there are electric motors for working the pumps, the periscopes, and the steering-gear, besides hand-gear for performing the same functions in case the motors should fail to act; while we must not overlook the mechanism which discharges the torpedoes. Add to all this sleeping, working, eating, and living space for twenty-five men, and I think your Chinese puzzle is complicated enough.

During the past year you have probably read a great deal about the periscope, that all-important adjunct to the equipment of the submarine, without which the commanding officer and his subordinates would be at sea metaphorically as well as literally. So long as the submarine is travelling on the surface, or awash, the steering is conducted from the conning-

tower in the usual fashion, but the peculiar place of the submarine is down below, well out of sight of hostile craft. The shaft of the periscope is about 18 feet long, and contains a series of lenses which throw a picture of the surrounding sea on to a reflector at the foot of the shaft. Thus the officer standing inside the submarine has a perfect little circular view of the surface of the water. The top of the periscope projecting above the sea is so very small that it is not easily seen, and offers a very difficult mark for the best of shots. It is almost impossible to discern a periscope at any distance from the deck of a ship. To meet this difficulty man's ingenuity has produced a specific enemy for the submarine, just as Nature provides an enemy for every one of her children to prevent them from having too easy a time. Seaplanes, at a height of 3000 feet, can see submarines travelling at 18 feet below the surface; and for this reason our seaplanes throughout the war have been engaged in most anxious and important work. For scouting purposes they are invaluable, and we cannot have enough of them.

The great improvement of the periscope is largely responsible for the decrease in fatal accidents. In the early days of submarine navigation many lives were lost as a result of the boats coming into collision with large vessels. Now collisions fortunately have become rare, while the mechanism has approached so nearly to perfection that things seldom go wrong. As a matter of fact floating on the surface is the submarine's natural condition, and she is induced to sink only by the taking in of a quantity of water in the ballast tanks, which brings her to the condition

known as "awash", and by then deflecting her horizontal rudders. The submarine remains beneath the surface only so long as the rudders are driving against the water, and should the engines stop and the boat lose "steering way", the rudders revert to their original position and the submarine returns to the surface and floats awash. She will rise completely when her water tanks are emptied by pumping.

Of course the equilibrium of a submerged submarine is a thing of extreme delicacy. The smallest increase or reduction of weight would upset the balance and cause the submarine to sink or rise with startling suddenness; therefore when a torpedo is discharged the *compensating tanks* fill immediately with a volume of water equal in weight to the torpedo that has gone. Bow and stern *trimming tanks* also are provided, into which water is pumped if the submarine shows a tendency to float too high at either end.

The submarine has two distinct fields of action open to it, these fields being governed by political situations. Occasions arise in times of peace when the peculiar properties of submarines are of the greatest value. Before now, submarines have passed safely underneath an icefield and come to the surface at precisely the spot intended; while storms that might spell disaster for ordinary vessels have no terrors for the ships that travel comfortably below the broken water. In both these cases the periscope is out of action, and navigation is performed solely by chart, compass, and log. Up to the present, the ordinary type of submarine has not been found suitable for salvage work, but experiments of this kind have been carried out

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A TOUGH JOB AND HOW IT WAS SOLVED

The *Tripolitania* was driven by a terrible gale in Mount's Bay right on to the shore well above the spring-tide high-water level. Balks of timber were fixed in position by the salvage engineers, and with powerful hydraulic jacks, as shown in the lower illustration, the vessel was pushed back sideways into the water.

with "Lake" submarines, designed by an American, Captain Simon Lake. These boats are fitted with wheels, and can be driven by their own engine power along the bed of the ocean. Now, if you read the first chapter carefully, you will remember that the ocean bottom presents itself in many different forms, hard and soft, rocky and slushy. Obviously, ordinary wheels would have some difficulty in rolling comfortably over such varied ground, but by a very ingenious arrangement the wheels of the Lake submarine can be made to press heavily or lightly, according to the nature of the "road". This is brought about by a series of water-tanks, which, by being filled or emptied, increase or reduce the weight as is desired. Thus, on soft ground, the weight need not exceed 100 lb., while on a hard bottom or where currents are strong it may be increased to as much as 1500 lb. When rocks are encountered, the vessel is lightened sufficiently to float over them. The floor of the Atlantic is said to be composed of fine hard sand forming a perfect surface, and submarine motoring might become quite a popular sport, were it not for the fact that it has not been found possible yet to build a boat that will stand any very great pressure and thus be capable of descending to great depths.

Before telling you all this, I ought strictly to have given you a few facts concerning the forerunner of the submarine boat—the human diver. As long, or nearly as long as men have swum, men have dived, but the obstacles presented by physical laws, which are more unalterable than the laws of the Medes and Persians, have prevented man, unaided by science,

from proceeding very far with the art. Three minutes is still a long time for a diver without a dress to remain beneath the surface, while the pressure of the water is as great and as fatal at a depth of 220 feet as it was in the days of Adam. Not that we have any data to prove that Adam was a swimmer, or that he even saw the sea. However, we are not concerned with idle surmise of that kind, but with the hard facts of modern necessity. Of course, there is nothing new under the sun, and Aristotle makes mention of a device for assisting divers to remain for a long time under water; but for all practical purposes the history of the diving dress begins in 1819, when Augustus Siebe, who founded the firm of Siebe, Gorman & Co., produced his first diving suit. That this was not altogether satisfactory is shown by the fact that if the diver stooped or stumbled, the water ran into his helmet and frequently drowned him before he could be hauled up. The year 1830, however, saw the perfection of the "closed dress" which made Siebe's name and fame. The modern dress is simply an improved form of this one of 1830, and is a very complicated and expensive garment; so much so, indeed, that I think we will honour it with a special paragraph.

To begin with, the suit itself consists of a combination garment made of sheet india-rubber faced on both sides with tanned twill. The trousers are laced down the back of the legs to prevent an accumulation of air inside the dress, which might lift the unfortunate diver upside down, and vulcanized rubber cuffs are gripped round the wrists by rubber rings. The breastplate and helmet are made of tin-plated copper.

The breastplate is fastened by screws and nuts to the rubber collar of the suit, while the helmet is screwed on to the neck of the breastplate immediately before the diver dives. The helmet is, of course, the most important part of the whole outfit. It is fitted with several different valves; one which supplies pure air but allows none to escape, so that if the air-tube were to become severed there would still be enough air in the helmet to support life until the diver could be hauled up; another, through which superfluous air escapes though no water comes in, while a regulator connected with this valve enables the diver to control his buoyancy, and by the retention or expulsion of air to sink or rise or remain suspended in the water. Thoroughly to understand how and why this happens, you must refer to the science of physics, which will tell you all about the pressure of water and the pressure of air, and how it is that the diver, clad in a cumbersome dress, weighted with 80 lb. of lead, carrying 16 lb. of lead on the soles of each of his boots, can walk comfortably along the floor of the sea, while he can go a step on land only with the greatest difficulty.

You must understand, however, that no diver of his own strength could resist the enormous pressure of water. He would be crushed and crumpled up to pulp in less than no time. But the compressed air which is pumped into his helmet from the surface creates a pressure on the inside sufficiently strong to resist the pressure from the outside. How great this pressure is is shown by the following interesting table, taken from Mr. C. W. Domville-Fife's *Submarine Engineering of To-day*:—

TABLE OF SUBMARINE DEPTHS AND PRESSURES

Depth (in feet).	Pressure (Pounds per sq. in.).	Time under Water from Surface to beginning of Ascent.	Total Time which must be taken in Ascending.
36	16	No limit	—
Every 6 ft. to—			
42	18½	About 3 hours	6½ minutes
48	21	,, ,,	12 ,,
54	24	,, ,,	22 ,,
60	26½	2 to 3 ,,	32 ,,
66	29½	1 ,, 2 ,,	,, ,,
72	32	1 ,, 1½ ,,	,, ,,
78	34½	1 ,, 1¼ ,,	,, ,,
84	37	40 ,, 60 minutes	30 ,,
90	40	35 ,, 55 ,,	32 ,,
96	42½	30 ,, 40 ,,	33 ,,
Every 12 ft. (expert deep-sea divers only)—			
108	48	25 ,, 35 ,,	33 ,,
120	53½	15 ,, 30 ,,	,, ,,
132	59	12 ,, 25 ,,	32 ,,
144	64½	10 , 20 ,,	31 ,,
156	70	10 ,, 16 ,,	30 ,,
168	75	9 ,, 14 ,,	,, ,,
180	80½	Up ,, 13 ,,	,, ,,
192	86	Up ,, 13 ,,	32 ,,
204 (Maximum considered safe)	91½	Up ,, 12 ,,	,, ,,

Twenty-five fathoms (150 feet) is usually regarded as the limit for practical diving.

Of great importance to the diver are the accessories of his outfit which, while not being a part of his dress, are nevertheless essential. He has to be provided with 150 feet of air-piping, and 180 feet of life-line, containing telephone wire by which he communicates with the surface and with his fellow workers. Spare parts innumerable he must have, and also rubber and solution for patching his dress, a knife, a lamp,

and a helmet spanner. In addition to the suit already described his equipment consists of three heavy woollen guernseys, three pairs of heavy hand-knitted drawers, three pairs of stockings for wearing inside the dress and one pair for wearing outside, a woollen cap and scarf, gloves, and an overall of strong canvas to protect the diving dress in rocky places.

The work of the diver is often dangerous and very varied in its nature, ranging from the insignificant little job of inspecting the mooring of a buoy a few feet below the surface to the difficult and perilous task of retrieving treasure from a sunken ship. Naturally the men who take up this exciting calling have to undergo a very severe training. First of all, they must be passed by the medical officer, and it goes without saying that numbers of fit and hardy seamen are quite unsuited to become divers, for a diver requires in a large degree certain mental qualities, such as coolness and resource, in addition to a healthy constitution and wiry frame. The British navy, and probably other navies have the same arrangement, provides large steel tanks containing about 15 feet of water, for the first lessons of the diving recruits. The tanks have windows in the sides through which the officer in charge can watch the occupants and see that they come to no harm.

The novice is not hurried off to the depths of the sea as soon as he has become accustomed to wearing his dress in the tank, but spends some time watching experienced divers ascend and descend, put on and take off their suits, and so on, until the dread of the depths melts away. His first trips are made in com-

pany with the old hands, but as soon as possible he goes down alone and learns to take care of himself. After that he is shown how to take care of an injured comrade, and what to do in case of accident either to himself or his dress. The technical knowledge necessary to perform the multitudinous tasks which fall to a diver follows in due time. Cleaning a ship's bottom is probably the first job he is given. This is a far less easy performance than it sounds, but it is one of the things a diver is most frequently called upon to do. Divers are a necessary part of the crew of every large ship belonging to the British fleet, and occupy themselves as ordinary seamen when their services are not required below the water. Of course there are many divers who confine themselves entirely to their own particular trade. This means that they earn anything up to £10 a week while they are at work; but they may be unemployed for months at a time, so that their living is precarious in both senses.

Constructional works of all kinds need the assistance of the diver—the underpinning of Winchester Cathedral is a notable example—while all round our coasts and at the mouths of our rivers there are piers and breakwaters which must be examined and repaired from below the water-line. But besides these he is employed to repair ships' bottoms and propellers, to hunt for lost anchors and torpedoes, to enter flooded mines or other subterranean workings —in fact, for every imaginable operation that has to be performed under water. Pearl and sponge fishing he undertakes cheerfully, but his most fruitful source of employment is salvage. This is most important

work, and unfortunately has very often to be taken in hand, since wrecks are constantly occurring.

It is estimated that ships and cargo to the value of £9,000,000 are lost off the shores of the British Isles every year. Some of these losses may be retrieved by salvage if the conditions are favourable, but the conditions are so many and various that very careful consideration has to be given to them. The locality at which the wreck took place is of the utmost concern. If the water be extremely deep, no diver can go down, while sharp rocks may spell cut life-lines. The *Titanic*, which perhaps may be accounted the most famous shipwreck the world has ever known, sank in nearly 2 miles of water, a depth so profound that by no possibility could salvage be attempted; but disasters in mid-ocean are happily rare. As a rule, ships are wrecked in the shallower "lanes" which encircle the maritime nations, if not actually on the coasts or on rocks at the summit of well-defined plateaux. Another factor which may make or mar the success of a salvage scheme is that most unstable one—the weather. Fair weather is essential, and gales or choppy seas put a stop to everything, so that it is sometimes necessary to wait for weeks or even months before sufficiently promising signs of calm appear.

As a preliminary, several divers go down to examine the vessel thoroughly and to bring back complete reports of her position and the damage sustained. A vessel, instead of sinking comfortably on to the sea bed, generally goes down either by the bows or the stern; that is to say, she buries one of her extremities in the sand and leaves the other

poised at a confusing angle. Moreover, as a rule she contrives to have a list to one side or the other. Thus, when the diver gets down to her, he may find the deck slanting so steeply that he is unable to keep his footing, while, supposing the wreck occurred through two boats colliding, the damaged portion may very well be hidden deep in mud. In the cases where the mischief was done by rocks, the ship may either be left sticking where she struck and have settled down by the weight of water within her, or, which is more likely, she will have lifted off the rock which ripped her and will be found lying on the rocky bottom, probably wedged into the most awkward corner imaginable. Again, the nature of her cargo will have great bearing upon the situation. Anything in boxes or cases can be lifted easily to the surface by means of cranes on the salvage boats, while anything fluid in casks or tanks can be pumped out and the casks turned into water-tight compartments that greatly increase the buoyancy of the boat. But a bulk cargo, such as coal or grain, presents obvious difficulties, since it must be shovelled out of the hold into a cage before it can be swung up to the surface.

However, once it has been decided that the vessel is to be raised, the holds are emptied somehow, and the hole in the vessel's side is patched up for the time being with bricks and a special cement which hardens in water. A wooden shield protects this wall on the outside, and metal girders strengthen it on the inside. If there should be any rocks poking through the vessel's sides or bottom they are blasted away with dynamite. When there is no longer any

possibility of water finding its way in by illicit means all hatches and other openings in the deck are shut down securely, leaving only specially made water-tight joints through which the pipes of the centrifugal pumps are passed. Then the divers leave the scene of their labours, while 12-inch centrifugal pumps merrily dispose of the water in the sunken vessel at the rate of 2520 tons an hour. When she is emptied, she will, or ought to, rise of her own accord, but it often happens that things do not turn out quite as they were intended to. The *Hypatia*, of Christiania, was raised four times and each time sank back into the sea, but the fifth attempt was successful.

But at this point you may have a question ready on your lips. "How is it," you are perhaps saying, "that when the water is pumped out of the holds the deck of the ship is able to withstand the weight of the water above it?" Quite right; and very often it does not. In fact, the attempt to raise a ship by its own buoyancy is something of a gamble. It may answer quite well; but on the other hand, if it does not—if the deck give way beneath the immense pressure it feels from the outside as soon as the pressure from the inside is withdrawn—there will not be much of the ship left to salve.

A surer method of salvage is by means of an erection called a coffer-dam, which is built up round the hold; or, in the case of small craft, round the whole ship. The coffer-dam is really a very strongly made wall of timber reaching from the deck of the sunken vessel to the surface. When after much care and trouble the dam has been made absolutely water-tight, the great centrifugal pumps are set to work

and all the water is removed from the space above the wreck. Thus the deck is freed from strain and the holds can be pumped dry without danger.

A coffer-dam is naturally out of the question where the vessel lies in a depth of water greater than about 50 feet. In such cases the wreck is raised by means of lifting craft, or several large hulks strongly moored together, from which divers descend to pass flexible wire hawsers right round the wreck. It is arranged that the hawsers pull taut when the tide is at its lowest ebb, then, when the tide rises, the wreck is lifted clear of the sea bottom. Strong tugs are attached to the hulks, and steam slowly towards the dock or the shallow water where it is proposed to beach the vessel. This operation may take days to complete, as progress can only be made at high tide, and in the case of large wrecks in very deep water the lifting power of the hulks has to be supplemented by pontoons. The pontoons—great wooden or iron tanks capable of a buoyancy of a thousand tons or more—are filled with water to make them sink, and then moored to the wreck. Meanwhile, water is pumped into the hulks until they are only just afloat and the hawsers are made taut. Then at the right moment the water is pumped out of the hulks and compressed air forces the water out of the pontoons, so that the hulks rise upwards as their buoyancy returns and the empty pontoons lift the wreck from the floor of the sea.

One of the greatest salvage achievements of recent times was the salving of the White Star liner *Suevic*. The *Suevic*, a fine boat of 12,500 tons, homeward-bound from Australia, went ashore on the Stag Rock

off the Lizard, on 16th March, 1907. When she was examined it was found to be quite impossible to raise her whole, so she was cut in two with dynamite. The forward end was so badly damaged by the grounding of the ship that it was left where it struck. The rest of the *Suevic* was made water-tight and with great difficulty towed to Southampton, and there taken into a dry dock. Her builders, Messrs. Harland & Wolff of Belfast, then set to work to build a new fore part, which, when finished, had to be towed to Southampton, where it arrived in safety after a stormy voyage lasting ten days.

The stranding of the *Tripolitania* involved salvage operations of a totally different kind. The *Tripolitania*, a fine Italian vessel of 2297 tons, was bound, with empty holds, from Genoa to Barry, in the Bristol Channel. From the beginning her voyage was dogged by bad luck and bad weather. She was thrashed by a gale in the Bay of Biscay, and owing to her light condition she steered badly, so that the captain could not maintain his proper course. He held on as best he could, hoping for better weather, but on Christmas Day, 1913, a terrible gale sprang up from the westward, and instead of rounding Land's End, he found himself off the Wolf Lighthouse. Still he battled bravely with adverse circumstances, but when daylight broke he was dangerously near the Lizard.

His position was desperate. He knew that he could never take his unseaworthy ship out of Mount's Bay in the teeth of the gale; he knew that ahead of him lay the cruel rocks of the Cornish coast. He knew, too, that in between the rocks there lay a strip of

sandy beach. That was his salvation. Full speed ahead, wind and tide helping her, the *Tripolitania* floundered towards Porthleven beach; struck, rolled broadside on and lay quivering to the blows of the giant seas that burst over her.

Now, if you would have an idea of the force of wind and waves in Mount's Bay on that Christmas Day, look on the plate facing this page. It shows the *Tripolitania* thrown on the sands *well above the spring-tide high-water level.* Perhaps it was a still more amazing freak of the elements that left this ship of more than 2000 tons quite uninjured. She only needed to get back into water again to be as sound a ship as when she had left the smiling Mediterranean.

This, then, was the task of the salvage engineers. An army of men dug the sand away from her, fixed balks of timber in position, and with powerful hydraulic jacks actually pushed the vessel sideways down towards the water. All this took months to accomplish, and cost many thousands of pounds. But alas! effort and money were wasted. When the *Tripolitania* had been pushed so far down the sand that it was hoped the next tide would float her, there sprang up a fresh gale. And in the night, when only a few watchmen were on board, the vessel floated of her own accord, and was thrown up again almost high and dry, about a hundred yards from her first resting-place. All the salvage gear was lost or destroyed; and the last I heard of the poor *Tripolitania* was to the effect that she was to be handed over to the tender mercies of the ship-breakers.

The recovery of lost treasure from the depths of the ocean is a subject that thrills us all, little though

we can guess of the actual conditions under which such exploits are achieved. The wreck of the *Hamilla Mitchell* on the Leucona rock, off Shanghai, attracted world-wide attention at the time; but the story will bear repetition well, since it is a record of man's courage and endurance. It was of the first importance to salve the vessel, because when she sank she carried within her hold £50,000 in coin and specie; but when Lloyd's agent visited the wreck he pronounced salvage impossible, on account of the great depth of water in which the vessel lay amongst high and dangerous rocks. This adverse opinion, however, did not prevent a certain Captain Lodge from making the adventure, accompanied by two expert divers named Ridyard and Penk. The party set out from Shanghai in a pilot cutter, but the actual diving had to be performed from a small open boat, as the cutter could not go amongst the rocks with safety. The two divers went down, but they were obliged to grope out at depths varying from 120 to 160 feet for a long time before they could find the vessel. Then suddenly they came upon her. She had broken in half, the heavy part, weighted with the treasure, lying in 160 feet of water. The diver Ridyard, after a perilous scramble, managed to make his way into the hold, where he beheld a sight not likely ever to grace my eyes—thousands upon thousands of dollars lying about in heaps! The worms of the sea had eaten up the boxes in which the dollars originally had been packed, but fortunately they had no taste for the coins.

Here the man worked valiantly, making four consecutive descents, and staying below the surface at

his last descent for four hours, a record for work at that depth. In all he sent up £40,000 worth of treasure. Naturally he was much exhausted after such strenuous efforts, and his comrade Penk offered to fetch him some water to drink from a spring high up on one of the neighbouring rocks. Ridyard gladly agreed, and Penk went off with a bucket. When he reached the point where the spring was he had an extensive view around him, and was much astonished to see numbers of white-sailed craft leaving the mainland. He hastily returned to the boat, and on hearing Penk's tale Captain Lodge at once made his way to the high peak of rock. To his dismay he discovered the white sails to belong to pirate boats, to the number of several hundred, which were, without a doubt, coming towards the diving party as fast as sails could bring them. Captain Lodge gave orders for the anchor and chain to be slipped and all speed to be made for the cutter, but the breeze being light it was necessary to use the oars. Poor Ridyard, who was suffering all the miseries attendant upon his exhausted state, yet pulled manfully at an oar until the little boat caught a fortunate breeze which carried them to the cutter. Once safely there, under cover of darkness they slipped back to Shanghai with their treasure. The £10,000 which they had been forced to leave behind remained in the wreck until the following year, when another expedition completed the salvage.

CHAPTER VII

Some Famous Voyages

Of all the thousands of brave men who, ever since the first tree trunk was launched—on the Euphrates, as some think—have gone down to the sea in ships, what record has been left? Men have conquered the dry land, in a literal sense. There is hardly a square mile to be found that the foot of man has not trodden, and wherever he has gone he has left traces of his visit. Not always in actual writing, or in words that we of the half-educated classes can read, but sometimes in weapons, sometimes in rude pictures, sometimes in plants, sometimes in buildings, sometimes in his own bleached bones we find the silent witnesses of the penetration of man. But of those who sailed the seas and reached the Port of Missing Ships we have no such traces. We do not know but that the Phœnicians may have reached America; only, as none of them came home to tell the tale, we say they never went. By which I mean to point out to you that the voyages we call famous are those of which we know most. They may not have been the ones that called for the greatest daring, nor the longest, nor the most difficult.

The Phœnicians, though they gave the world an alphabet, left no literature. Their exploits were never

written down, nor were they ever sung. At the most they were told for a generation or two. How far this omission was due to their climate it is hard to say, but no doubt the fact that the Mediterranean knows little or no winter had something to do with it. The Northern mariners, such as the vikings and the Britons, would, if they had made enough money in their previous voyages, spend the winter by their own firesides, with their toes in the ashes. The vikings would while away the time with their wonderful sagas, which have preserved the story of their greatness for us for all time. The English would tell tales first of the tyranny of Spain; then, as time rolled on, they would whisper that the Dutch had revolted and were taking Spanish ships; and at last, most wonderful of all, that English captains were beating the Spaniards and taking their treasure. And old sailors would be pressed to tell of the strange adventures they had had in far-away places, and the hearts of boys would throb and their breath come more quickly as they listened, and resolved to do likewise themselves.

When first the Hanseatic League was formed one of the rules laid down by its leaders was that ships ought to be in port by Michaelmas (29th September), and that no merchant should send his ship to sea between St. Martin's Day and Candlemas (11th November to 2nd February). But—and this is worth noting—a ship laden with beer, herrings, or dried cod was allowed to go to sea on St. Nicholas's Day (6th December). This was because the fish would be wanted for Lent, and beer might spoil if it were carried in the spring. The Greek coasting vessels

THE MEMORABLE VOYAGE OF SEBASTIAN CABOT

From the painting by Ernest Board in the Bristol Art Gallery.

The picture shows Cabot setting out from Bristol, in the *Matthew*, on the voyage on which he discovered North America in 1497. The Mayor of Bristol is seen bidding farewell to the adventurous traveller.

keep up a similar custom to this day, and never start on a voyage between St. Nicholas's Day and the New Year. The rule was for a ship to winter wherever it might happen to be, and in this way sailors of many different nationalities came into touch with one another, and, when they were able, exchanged yarns.

We know little of the individual voyages of the Phœnicians, but I can tell you, if you do not know already, where to find a most graphic description of a journey undertaken in a boat of their period, possibly a Phœnician boat. It is in the Acts of the Apostles, beginning at chapter xxvii. The journeys of St. Paul are certainly amongst the famous voyages of the world, not because he discovered any new countries, but because St. Luke has left us a true and detailed story of his master's experiences. The earliest voyage of which we have any record at all was that of a fleet sent out by Niku, who reigned in Egypt from 610 to 594 B.C. Herodotus has left an account of this expedition, of which he says Niku "sent to sea a number of ships manned by Phœnicians, with orders to make for the Pillars of Hercules, and return to Egypt through them and by the Mediterranean. The Phœnicians took their departure by way of the Erythræan Sea (Indian Ocean), and so sailed into the southern ocean. When autumn came they went ashore wherever they might happen to be, and, having sown a tract of land with corn, waited till the grain was fit to cut. Having reaped it, they again set sail; and thus it came to pass that two whole years went by, and it was not till the third year that they doubled the Pillars of Hercules and made good

their voyage home. On their return they declared—I for my part do not believe them, but perhaps others may—that in sailing round Libya (Africa) they had the sun upon their right hand."

We have now to take several centuries at a leap before we come to any more voyages that need mentioning here. The seamen of the world were not idle meantime; but we must press on now to the thirteenth century, where we find the man who made one of the most famous voyages of all time. Yet his actual travelling was more by land than by water, and you may disagree with my estimate of his importance if you do not happen to have studied his life and work.

The man is Marco Polo, the Venetian who journeyed to Cathay, and served the Khan, Kublai, for seventeen years. Not much of a voyage this, you will say, considering that he travelled overland for three years and a half when making the journey from Armenia to Pekin; and though he spent two years on the voyage from China to Persia, we are not to suppose he was actually all that time on the sea. No; but maybe you forget the essential part of Polo's greatness. Many another man may have journeyed through China and have visited India and Persia, but we know nothing about it. Marco Polo, in his book, made a complete record of all his travels and of the wonderful things which he saw and heard of in the kingdom of Kublai Khan. Nothing was unworthy of his notice, and the result is a most graphic and inspiring story. He tells of all the countries he visited, what the people were like, and how they lived; the ships they used, and their horses and cattle. He gives us full details of Kublai's court and

government, and incidentally reveals him to us as a very honourable and upright sovereign. But most of all he unfolded Asia and the glory and wonder of the East to Western eyes. No one before had had such a story to tell. Europeans knew little of Asia beyond what they learnt from the Bible and the half-mythical tales of old Crusaders. And more than this he did, for Columbus held *The Travels of Marco Polo* his favourite book, and who shall say what inspiration and resolve he did not receive from that source. His records gain in usefulness from the fact that the East is much the same to-day as it was yesterday. The following description of Indian vessels, which with a few variations would apply equally to the Chinese, would serve for the native-built ships of the present day:—

"We shall commence with a description of the ships employed by the merchants, which are built of fir-timber. They have a single deck, and below this the space is divided into about sixty small cabins, fewer or more, according to the size of the vessels, each of them affording accommodation for one merchant. They are provided with a good helm. They have four masts, with as many sails, and some of them have two masts which can be set up and lowered again, as may be found necessary. Some ships of the larger class have, besides the cabins, to the number of thirteen bulkheads or divisions in the hold, formed of thick planks let into each other.[1]

"The object of these is to guard against accidents which may occasion the vessel to spring a leak. . . . The ships are all double-planked; that is, they have a

[1] *Incastrati*, mortised or rabbeted.

course of sheathing boards laid over the planking in every part. These are caulked with oakum both withinside and without, and are fastened with iron nails.

"Ships of the largest size require a crew of three hundred men; others two hundred, and some one hundred and fifty only, according to their greater or less bulk. They carry from five to six thousand baskets (or mat bags) of pepper. . . . When a ship, having been on a voyage of a year or more, stands in need of repairs, the practice is to give her a course of sheathing over the original boarding, forming a third course, which is caulked and paid[1] in the same manner as the others; and this, when she needs further repairs, is repeated, even to the number of six layers, after which she is condemned as unserviceable and not seaworthy." See how the Orient anticipated us! Here is a thirteenth-century Indian ship embodying several essential features of a modern leviathan—the separate state-room for each passenger, the double skin, and water-tight bulkheads!

Hakluyt, in his *Principal Voyages of the English Nation*, mentions some interesting details of the travels of Sebastian Cabot. We know little about Cabot beyond the fact that he offered his services alternately to England and Spain, and that he was the first mariner to notice the phenomenon which we call the variation of the compass. During his lifetime he was principally known as a cartographer; for, either from adverse circumstances or the malice of his rivals, many of the expeditions which he headed ended in

[1] *Paid*, the operation of driving oakum soaked in pitch between the seams of a ship's planking.

failure. In 1519 he was appointed pilot-major to the kingdom of Spain by Charles V, and in this capacity he sailed the coasts of Brazil and La Plata with the object of planting colonies. This attempt was far from being successful, and poor Sebastian was imprisoned for one year, and banished for two more to Oran in Africa. In 1547 he returned to England, where he obtained the patronage of Edward VI, and in 1553 he embarked on a project which brought him his long-expected reward. This was the expedition of Merchant Adventurers, which resulted in the opening up of a most profitable trade between England and Russia. He died three years later at the age of eighty-three. Hakluyt gives Sebastian's life as told by himself to Galeacius Butrigarius, "the Pope's Legate in Spaine", in the following words:—

"When my father departed from Venice many yeeres since to dwell in England, to follow the trade of marchandises, hee tooke mee with him to the citie of London, while I was very yong, yet having nevertheless some knowledge of the letters of humanitie, and of the Sphere. And when my father died in that time when newes were brought that Don Christopher Colonus Genuese had discovered the coasts of India, whereof was great talke in all the Court of King Henry the 7, who ther raigned, insomuch that all men with great admiration affirmed it to be a thing more divine than humane, to saile by the West into the East where spices growe, by a way that was never knowen before, by this fame and report there increased in my heart a great flame of desire to attempt some notable thing. And understanding by reason of the Sphere, that if I should saile by way of the North-

west, I should by a shorter tract come into India, I thereupon caused the King to be advertised of my devise, who immediatly commanded two carvels to bee furnished with all things appertayning to the voyage, which was as farre as I remember in the yeere 1496, in the beginning of Sommer. I began therefore to saile toward the North-west, not thinking to finde any other lande then that of Cathay, and from thence to turne toward India, but after certaine dayes I found that the land ranne towards the North, which was to mee a great displeasure. Neverthelesse, sayling along by the coast to see if I could finde any gulfe that turned, I found the lande still continent to the 56 degree under our Pole. And seeing that there the coast turned toward the East, despairing to finde the passage, I turned backe againe, and sailed downe by the coast of that land toward the Equinoctiall (ever with intent to finde the saide passage to India) and came to that part of this firme lande which is nowe called Florida, where my victuals failing, I departed from thence and returned into England, where I found great tumults among the people, and preparation for warres in Scotland: by reason whereof there was no more consideration had to this voyage.

"Whereupon I went into Spaine to the Catholique king, and Queene Elizabeth, which being advertised what I had done, intertained me, and at their charges furnished certaine ships, wherewith they caused me to saile to discover the coastes of Brasile, where I found an exceeding great and large river named at this present Rio de la plata, that is, the river of silver, into the which I sailed and followed it into the firme land, more than sixe score leagues, finding it every-

where very faire, inhabited with infinite people, which with admiration came running dayly to our ships. Into this River runne so many other rivers, that it is in maner incredible.

"After this I made many other voyages, which I nowe pretermit, and waxing olde, I give my selfe to rest from such travels, because there are nowe many yong and lustie Pilots and Mariners of good experience, by whose forwardnesse I doe rejoyce in the fruit of my labours, and rest with the charge of this office, as you see."

Baptista Ramusius attributes Cabot's failure to find the North-west passage to "the mutinie of the ship-master and Mariners" which "hindered him and made him to returne homewards from that place". Yet another testimony to his achievements is found in the writings of Peter Martyr of Angleria, who says:—

"These North Seas have bene searched by one Sebastian Cabot, a Venetian borne, whom being yet but in maner an infant, his parents caried with them into England, having occasion to resort thither for trade of marchandise, as is the maner of the Venetians to leave no part of the world unsearched to obtaine riches. Hee therefore furnished two ships in England at his owne charges, and first with 300 men directed his course so farre towards the Northpole, that even in the moneth of July he found monstrous heapes of ice swimming on the sea, and in maner continuall daylight, yet saw he the land in that tract free from ice, which had bene molten by the heat of the Sunne. Thus seeing such heapes of yce before him, hee was enforced to turne his sailes and follow the West, so coasting still by the shore, that he was thereby brought

so farre into the South, by reason of the land bending so much Southwards, that it was there almost equall in latitude, with the sea Fretum Herculeum, having the Northpole elevate in manner in the same degree. He sailed likewise in this tract so farre towards the West, that hee had the Island of Cuba on his left hand, in maner in the same degree of longitude. As hee traveiled by the coastes of this great land (which he named Baccalaos), he saith that hee found the like course of the waters toward the West, but the same to runne more softly and gently then the swift waters which the Spaniards found in their Navigations Southward. Wherefore it is not onely more like to be true, but ought also of necessitie to be concluded that betweene both the lands hitherto unknowen, there should be certaine great open places whereby the waters should thus continually passe from the East unto the West: which waters I suppose to be driven about the globe of the earth by the uncessant moving and impulsion of the heavens, and not to bee swallowed up and cast up againe by the breathing of Demogorgon, as some have imagined, because they see the seas by increase and decrease to ebbe and flowe. Sebastian Cabot himself named those lands Baccalaos, because that in the Seas thereabout hee found so great multitudes of certaine bigge fishes much like unto Tunies (which the inhabitants call Baccalaos), that they sometime stayed his shippes. He found also the people of those regions covered with beastes skinnes, yet not without the use of reason. He also saith there is great plentie of Beares in those regions which use to eate fish: for plunging themselves into ye water, where they perceive a multitude of these fishes to lie, they

C 766

Photo. Gibson & Sons, Penzance

THE *POTOSI*, A SAILING-SHIP OF 4000 TONS

A romantic interest attaches to such an illustration as the above, as year by year the giant sailing-vessels grow more rare. No longer do China "clippers" make breathlessly exciting races across the ocean, doing their 16 knots with ease. There is only one sailing-ship larger than the *Potosi*—the *France*, of 5600 tons. Both fly the French flag.

THE *DIMSIE III*

MR. P. F. WESTERMAN'S *NORSEMAN*

C 700

Norseman Photo, A. Rapp, Southampton

THE YACHTSMAN AND HIS CRAFT

The *Dimsie III* has several times made a run from Burnham on Crouch to the Solent and back.

fasten their clawes in their scales, and so draw them to land and eate them, so (as he saith) the Beares being thus satisfied with fish, are not noisome to men. Hee declareth further, that in many places of these Regions he saw great plentie of Copper among the inhabitants. Cabot is my very friend, whom I use familiarly, and delight to have him sometimes keepe mee company in mine owne house. For being called out of England by the commandement of the Catholique King of Castile, after the death of King Henry the seventh of that name King of England, he was made one of our council and Assistants, as touching the affaires of the new Indies, looking for ships dayly to be furnished for him to discover this hid secret of Nature."

The voyage of the *Mayflower* is fàmiliar to everyone, and certainly deserves a place here. Yet as a voyage it was comparatively uneventful. I say comparatively, because it is true that the Pilgrims were oppressed by bad weather almost from the start, and the voyage from Leyden to Cape Cod occupied nine weeks. They were, moreover, burdened with sorrow and anxiety, and only the sternest sense of duty and resolve could have prompted them finally to cut themselves off from the land of their birth. But the *Mayflower* and its cargo of Pilgrims must ever be had in remembrance for three reasons: first and foremost, because the Pilgrims had exiled themselves voluntarily on account of their religious opinions; secondly, because they were of the hard, strong stuff which made the impregnable foundation of New England; thirdly, because by stress of weather they found themselves at Cape Cod instead of Virginia.

This last reason does not seem particularly noteworthy, until we remember that Cape Cod in the late autumn offers a particularly uninviting shore—bleak, barren, and black with frost. Winter was upon the settlers before they could build houses, and the icy cold, together with privation and over-hard work, brought disease and death into the camp. At one time there were only six well persons to care for the others, and when at last the spring dawned, more than half the settlers had died, among the number being the governor, Mr. Carver. But the survivors never wavered. They elected a new governor, and went on with their strenuous labours; not one of them asked to go back in the *Mayflower* when she returned to England in April.

You may say, with some reason, that the struggles of the early settlers in New England have no place in a chapter on Famous Voyages; but I have made a point of mentioning them because the establishment of the American colonies has so much to do with the ultimate conquest of the sea. The *Mayflower* was not the first ship to sail away loaded with stalwart Britons who never returned to their native land. The *Good Speed*, the *Discovery*, and the *Sarah Constant*, small ships which crept past the Chesapeake capes at the end of April, 1607, hold the honour of carrying the first permanent English settlers to Virginia. These little boats had been four months upon the sea, and in those days the Atlantic was not the thronged highway it is now. Neither were there any people but hostile savages to welcome them on their arrival; but the smooth green shores, tall trees, and fresh streams must have seemed better than pearls and fine gold to

the weary voyagers. Only about a hundred men, and no women at all, were put ashore by those three ships, and many of them were not the best material with which to found a colony. It was then as it is now: in every band of adventurers there were ten wasters to one of the bull-dog breed. Few of them had been trained to any trade, and most of them were of the "get-rich-quick" class, or, as they were called then, "humoursome and tuftaffety sparks". Notice the difference between the *Mayflower* Pilgrims and these earlier settlers. The Pilgrims were of the best kind, industrious, sober, and hardy, who used a new country as a field for the development of their characters and sense of duty. The others were the worst kind, who, being unable to suck a living out of the old country, had gone to the new to see if haply a bag of money were more easily come by there than at home.

The English colonists were followed by others from Holland, and in 1619 a Dutch man-of-war sold twenty negroes as slaves to the settlers. These seem small things, a few boatloads of emigrants and a handful of slaves, yet from these humble beginnings grew wars and tumults, oppression and rebellion, culminating at last in powers which assuredly are not the least of those of the civilized world. What they have done for trade you shall see in another chapter. They have done incalculable things for science and progress. You see, the story of the conquest of the sea can only be explained by the story of its conquerors, and most of the events which make the history of man took place on land. When, later on, we come to consider the giant ships which to-day form a commonplace part of the scheme of things, we must

not forget that they owe their existence to the perseverance of those dogged men and women of the early seventeenth century.

Few people realize that it is only during the last hundred years that our maps of the world have been completed, and that even now, when we know the bare outlines of the continents and can draw them blindfold with ease and a certain amount of accuracy, the interiors of some of them are still unknown and forbidden lands to civilized races. The age of exploration is by no means dead. Although we have sailed on all the seas and penetrated from pole to pole we still know little of the centre of Africa, and next to nothing at all of the centre of Australia. But we have in recent years learned things of paramount importance, for men of science, having found the boundaries of the sea, set themselves to examine the sea itself.

The voyage of the *Beagle* is famous less on account of its services to the scientific world, which are appreciated only by the scientific world, than on account of the fact that Charles Darwin held the post of naturalist to the expedition. His book, *The Voyage of the Beagle*, is a most interesting record of his investigations. The voyage lasted for five years, and the experience Darwin gained from it bore fruit in his book on coral reefs, besides laying the foundations of the biological and zoological investigations which were to form his lifework. The *Beagle* reached home in 1836, and the work begun by its leaders was continued in 1868 by the *Lightning*, and in 1870 by the *Porcupine*.

In 1872 the British Government sent out the most important of all the research ships. This was the

Challenger, which, under the command of Captain Nares (the scientific work being conducted by Professor Wyville Thomson), sailed nearly 70,000 nautical miles. At three hundred and sixty-two points investigations were taken to determine the depth of water, temperature at the bottom and at the surface, nature of the currents, flora and fauna, and the atmospheric and meteorological conditions. The ship was perfectly equipped for this work, and carried the best appliances then procurable. She had a splendid chemical laboratory, an aquarium, and a natural history room. The monumental labours of this expedition have been embodied in a work in fifty volumes, *Reports on the Scientific Results of the Voyage of H.M.S. Challenger.*

It would be hard to find stories more thrilling than those that centre round the Chinese tea-clippers. These boats were superbly built, carrying acres of sail, and were the "ocean greyhounds" of their day, continually breaking one another's speed records.

The China clipper was an American production, the outcome of the swift and handy boats, generally schooner-rigged, that were evolved during the European wars of the late eighteenth century. American designers brought science into their shipbuilding, and American skippers and crews had unlimited dash and daring. With a vessel that could dodge the blockading fleets of England and France; with unlimited supplies of timber for building such vessels; with a vista of unlimited profits with cargoes at £8 or £9 a ton; with American spirit and initiative at the back of it all—no one could be surprised that the ocean-carrying trade should pass into American

hands. From 1812 till 1845, or thereabouts, the American sailing packet was unrivalled, and American seamen were the best in the world. Although we copied American models, timber was so dear in Britain and so cheap on the other side of the Atlantic that we never had a chance to catch up. It was iron and steam—let us say British engineering progress and ability—that gave us our proud position as mistress of the seas. It was our iron-fields and our coal-mines, our inventors and trained engineers, aided by a business aptitude that in those days was better than our neighbours', that made us the Carter Paterson of the world.

The clipper survived in the China trade long after British steamship lines had captured the Atlantic trade. The best clippers were built between 1860 and 1869. During that period the method known as composite building was introduced, according to which a ship was built of iron overlaid with wood and fitted with steel masts and rigging. The *Thermopylæ*, a ship of this description, made a record on her maiden voyage between London and Melbourne which no other sailing-ship ever surpassed, completing the journey in sixty days. The *Lightning*, a Boston clipper manned by a British crew, made the record for a single day's sail—430 miles in twenty-four hours. In shipping circles, and sporting ones too, no doubt, the speed attained by these boats was a matter of the greatest interest, while even the most retiring of maiden ladies would be glad to hear that her tea had come quickly and safely across the wastes of ocean and would not have spoiled on the voyage.

For the crews of the clippers the voyages were

generally matters of intense excitement, sometimes of grave concern; for the ships were "put through" everything—fair weather and foul weather—with the sole object of getting their cargoes into port as speedily as possible. On that, and on that alone, depended their chance of livelihood. They were superbly handled, these lovely craft that have passed away. "When the wind served the captain remained on deck day and night to keep her going. The sheets and halliards were made of chains, and were locked so that frightened sailors could not let them fly. Studding sails were spread to the zephyrs on the equator, and kept stretched when the trade winds made the rigging scream."

Perhaps the most exciting race ever sailed was that out of Foochow in 1866. Nine clippers were to have sailed as soon as they had taken on board their cargoes of new season's tea, but four of them took so long to load that they were not amongst the starters. The five rivals left in the following order: *Fiery Cross*, at dawn, 29th May; *Ariel*, 10.30 a.m., 30th May; *Serica* and *Taeping*, 10.50 a.m., 30th May; *Taitsing*, midnight, 31st May. *Fiery Cross* thus had a good start, but when she rounded the Cape of Good Hope on 13th July she was closely pursued by *Ariel* and *Taeping*. *Serica* was four days' voyage behind, while *Taitsing*, the last started, was eight days to the bad. Nevertheless *Taitsing* had plenty of fight left, and the ships crossed the Azores in very different order, *Ariel* leading, *Taitsing* second, *Fiery Cross*, *Serica*, and *Taeping* following on.

These two last vessels, however, now began to show what they could do. Leaving *Taitsing* and

Fiery Cross behind, they closed up with *Ariel*, *Taeping* actually passing her on 5th September. Next day *Taeping* lost a few minutes when taking on her pilot off Dungeness, but she made up again, arriving in London Docks at 9.45 p.m. on 6th September. *Ariel* was a good second, coming into East India Docks at a quarter past ten; while *Serica* put into West India Docks an hour and a quarter later.

At the present time polar exploration fills the minds of the adventurous. To those who do not understand it, the call of the poles seems an inexplicable thing. A barren, frozen country, containing no animal or vegetable resources, and, so far as we know, no minerals of any practical use, since the cost of getting them from the ice rocks would be prohibitive; a region which has proved a graveyard for brave men; yet year by year we read of expeditions setting out with the polar regions for their destination.

We must never under-estimate the work of the polar explorers. It is easy to say, as we often hear it said, "Oh, what is the use of it? Thousands of pounds are spent and many useful lives lost, simply in an attempt to plant the flag on a spot that is of no use to anybody." That is not the way to regard the matter. A dash for the pole is by no means simply a piece of bravado or an outlet for superfluous energy. It is a business involving the hardest of hard work—the sort of work a man was never meant to undertake in a climate no animal was ever created to inhabit; a business frequently including semi-starvation, and always resulting in disease and death to some, at least, of the members of the expedition. There is no room for "humoursome and

tuftaffety sparks" at the poles. All the men who get beyond latitude 60°, north or south, mean business, and are prepared for anything. And we cannot, at this stage, define the limits of the "usefulness" of polar research.

For one thing, as free sons of the country which claims to rule the seas, we have no right to accept the statement that there are parts of the world which man can never penetrate. If we mean to inhabit the earth as intelligent beings we must learn all we can about it. But besides mere curiosity, there is much to be learnt from the journeys to polar regions. The voyage of the *Scotia* to the Antarctic in 1902–4 resulted in enormous additions to our meteorological knowledge. Mr. Robert C. Mossman, head of the chief meteorological station in Edinburgh, accompanied the expedition, and his efforts were mainly instrumental in drawing attention to the vast importance of the Antarctic in a meteorological sense, although other expeditions had also taken observations at different times. Here is a list of the sciences that, according to Dr. William Bruce, Director of the Scottish Oceanographical Laboratory, every polar expedition should cover in its investigations: "Astronomy; meteorology, including an investigation of the higher atmosphere by means of balloons and kites, as well as sea-level observations; magnetism; ocean physics, including an investigation of currents, temperature, specific gravity at all depths from the surface to the bottom; bathymetry[1], including a complete study of the shape of the floor of the Polar Basin; geology,

[1] *bathys*, deep; *metria*, measurement; the measurement of the depths of the ocean.

especially a study of the nature of the bottom; biology, an investigation of every living thing, those animals that live on the bottom of the sea, those that swim on or near the surface or in intermediate depths—in short, benthoic, planktonic, and nektonic research; a study of the algæ and animals that may be found in association with the ice itself, as well as an investigation of every animal or plant above the surface of the ocean."

It is believed that at no very distant date, data taken in the Antarctic will foreshadow the condition of the Indian monsoon; that is to say, that if it is to be a bad year, warning can be given in time to enable provision to be made against famine. When we think of the appalling suffering and loss of life that occurs in India from famine, we cannot say that any attempt which may lead to the betterment of such conditions is a waste. I do not mean to say that every polar expedition has meteorological observations as its chief aim. The fact is, that once a man succumbs to the attractions that the poles hold for him he can never shake it off. Listen to this passage from Mr. W. G. Burn Murdoch's *From Edinburgh to the Antarctic*:—

"A dreamy stillness fills the air. To the south the sun has dipped behind a bank of pale grey cloud, and the sky above is touched with primrose light. Far to the north the dark, smooth sea is bounded by two low bergs that stretch across the horizon. The nearest is cold violet-white, and the sunlight strikes the furthest, making it shine like a wall of gold. The sky above them is of a leaden peacock-blue, with rosy cloudlets hanging against it—such colourings as I have never before seen or heard described. To the

westward, across the gulf, we can just distinguish the blue-black crags jutting from the snowy lomonds. Little clouds touched with gold and rose lie nestling in the black corries, and gather round the snowy peaks. To the south, in the centre of the flow, some bergs lie cold and grey in the shadow of the bank of clouds. They look like Greek temples imprisoned for ever in a field of snow. A faint cold air comes stealing to us over the floe; it ripples the yellow sky reflection at the ice-edge for a moment, and falls away. In the distance a seal is barking—a low muffled sound that travels far over the calm water, and occasionally a slight splash breaks the silence, as a piece of snow separates from the field and joins its companion pieces that are floating quietly past our stern to the north—a mysterious, silent procession of soft, white spirits, each perfectly reflected in the lavender sea."

And to this one from Commander R. E. Peary's *Nearest the Pole*:—

"While lying-to waiting for the captain's return, the stars twinkled as in winter, a biting wind whistled through the rigging, and a brilliant curtain aurora waved across the northern sky, while ashore the dogs were howling merrily. Pacing the bridge, these familiar sights and sounds stirred me with the call of the polar mystery. Might it not be possible that this breath, this presence, as it were, of the 'Great Night' was reaching down far beyond its usual haunts to greet and welcome my coming?"

If you are not absolutely devoid of imagination, and these extracts fail to touch you, I am afraid you must be sadly in need of a strong course of cold baths.

CHAPTER VIII

Yachting and Yacht Adventures

If I could have the moulding of your bent you would be a gardener and a small-boat sailor. It would be quite useless to protest that your back was not made for digging, that weeding was only for women and old men, that crawlers gave you the creeps. It would be quite useless to lament a tendency to sea-sickness, or to whine that you never felt "drawn to the sea". To dig you should learn, to sea you should go, in spite of yourself—if I could have my way.

It may be just as well for us both that I cannot have my way. But I do honestly believe that these two pursuits, gardening and sailing, lead to a higher self-discipline than all other sports and relaxations men follow. As a gardener you will sound the depths of humility and (on rare occasions) rise to heights almost sublime. As a yachtsman—I hate the word, with its suggestion of peaked caps and carefully creased white trousers; but there it is, and we cannot get away from it—as a yachtsman you will enjoy an independence of spirit that nothing else in the world can give you. Ashore you are merely a unit in a vast community, a nonentity toiling in the rut of the wheel of circumstance. Afloat, you are a pretty little lord of creation, all complete. You can be a great navigator or a

pirate, or a bit of both; but whatever you are, and whatever your craft, you and she are just as good as (and probably a bit better than) anything else on the broad water.

Truly it is a wonderful combination, that of salt water and free air and a scrap of a "Flying Scud" or "Stormy Petrel". It has power to make men of us all, to level us up and shake us down, so that the meekest grocer's assistant, afloat in a Danish butter tub, is as fine a fellow and as independent as his master in a 70-ton auxiliary schooner. I have seen a great artist, a most austere and terrible person, frying steak and "'taters" at the galley stove, what time he "played the goat" like any schoolboy. I have seen a most mild-mannered little curate, when under the influences of salt spray, torn flannel trousers, a grimy sweater, and a two-days' growth of beard, grow truculent as Captain Kettle himself, and bold enough to fling stout bottles at the gold-laced officer on the bridge of a 3000-ton tramp. I have seen him threaten to brain a bargeman six times his size—an inspiring spectacle, albeit unbecoming in a curate. And I have feasted on sardines and condensed milk straight from their tins, unspoilt by knife or fork or mug (and not accompanied by bread), and vowed they were food for the gods.

Wherefore I say to you, if you would know the fullest joy of living, build you a boat or buy one—never hire and never borrow—and go a-roving on the nearest piece of salt water you can find. But mark this: the water must be salt. No lake nor mere—even though you cannot see its farther bank—has power to give you that wondrous sea-feeling that is

perfect freedom. If you can't get salt water, stay at home and dig.

It is not easy to define exactly the part which yachting has played in the conquest of the sea, for the simple reason that the origins of the sport as we know it at present are vague and not to be fixed with any definiteness to a certain date. If one defines yachting as "going afloat for pleasure's sake", then many of the mediæval navigators, privateers, pirates, and freebooters were yachtsmen in the modern sense. They went to sea on the impulse of an irresistible instinct, and the conditions of life in those days led them to accept any moral or material advantage they could gain by force of arms. This is shown by the generally accepted origin of the word "yacht", which in its earliest form appears as "jacht", a Dutch word presumed to be derived from "jagen", to chase or to hunt.

In an organized way, yachting began in Great Britain at the end of the eighteenth century, when the Cumberland Fleet and the Royal Yacht Club (now the Royal Yacht Squadron) came into existence, modelled something on Navy lines. The development of small-boat sailing as a pure sport appears to have come much later, although it is certain that wherever boats were to be found there were also to be found persons to go afloat in them for the pure pleasure of sailing. They could not go far afield in the very early days, though, as the North Sea and the Channel were the haunts of ships of war, privateers, and miscellaneous freebooters, who were not above snapping up any boat or crew which might be useful to them.

Considering the nature of vessels and the condition of things in the Middle Ages, the voyages accomplished by many men whom we must class as yachtsmen were little short of marvellous. Charts scarcely existed, buoyage was practically unknown, while the systematic lighting of coasts and channels had hardly been thought of. However, they made the voyages, many of them; and the thousands of yachtsmen who pursue their sport in the waters surrounding the British Isles are the descendants of those hardy gentlemen who ventured boldly forth with small craft into the unknown. Little by little they helped to build up our supremacy afloat and to add to our knowledge of conditions at sea, which has increased and grown through the centuries; so that nowadays a steam yacht or large sailing cruiser will start off for a cruise of months' duration as easily as one would start to cross the road.

One of the earliest records of the yachting instinct is the history of Sir Richard Barton, who, feeling aggrieved on some matter, "took out letters of marque against certain Portingalls" in the sixteenth century. He did not succeed in finding them, and engaged in general piracy, for which he was ultimately brought to book. Practically the first complete log of a pleasure trip—though the pleasure was of doubtful value—is that of the voyage of Richard Ferris from London to the "city of Bristow", which he made successfully in 1590. He undertook it in a spirit of joyous adventure as the result of a wager that he would prove that "Britannia did indeed rule the waves". Ferris, who was a Messenger of Her Majesty's Chamber, set off with a friend, Andrew

Hill, in a small wherry-boat, and "in respect that I never was trained up on the water, I thought it convenient to seek out some one expert pilot to direct me and my companion by his skill the better to pass the dangers whereof I was foretold". So a certain W. Thomas was added to the tiny muster-roll. The wherry left Tower Wharf on 24th June, 1590, and at Greenwich they stopped for "entertainment". Then the sails were hoisted, and taking to their oars they set off "towards this our doubtful course".

Ferris subsequently admitted that his venture was "rashly determined"; off the Foreland they encountered some "high billows", but from there—with proverbial beginners' luck—they had a leading wind and fair weather right into the Solent. There they had a "great storm", but got through to find a bad sea running off St. Alban's Head. More "high billows" were met off Portland and off the Start; at Plymouth they put in for further "entertainment". Later they passed the Lizard in a swingeing tide, and on 29th July rounded Land's End, standing well out. After sighting a pirate, meeting foul weather and more high billows, they arrived off Harty Point, where Ferris's friend narrowly missed a watery grave, falling into the sea while lowering sail; but "by great good hap, and by means that he held fast to a piece of our sail, we recovered him, although he were a very weighty man".

When they reached Ilford Combe (Ilfracombe) they decided to keep on and make a night passage, which proved one of the most trying stages of the whole trip, till they passed Minehead, near Bristol, where "all was feasting and junketing, with trumpets,

A FAMOUS YACHT AND ITS OWNER

The craft moored in the foreground is the *Falcon*, which, in the hands of an amateur crew, made a noteworthy cruise to South America. Inset is a photograph of Mr. E. F. Knight, the great war correspondent, owner of the *Falcon*, which is now used as a house-boat.

Photo, Sport and General

THE DEPARTURE OF THE MOTOR-BOAT *DETROIT* ACROSS THE ATLANTIC

Captain T. F. Day had an amateur crew aboard his 45-foot vessel. The first port touched at after New York was Queenstown, after which the boat crossed the North Sea to Petrograd. Very bad weather made the voyage a venturesome one in such a small craft.

drums, fifes, and ensigns to go before the boat". They returned overland, all the same. Although one may smile at Ferris's quaint phraseology, it was an arduous and risky trip to undertake.

Another great small-boat cruiser of those early days was John Taylor, who combined the vocations of Thames wherryman and poet. In 1622 he made a voyage from London to York in a wherry, which he describes in a long poem under the title "A Verry Merry Wherry-Ferry Voyage, or Yorke for my Money". He relates with gusto and a deal of quaint humour the details of his coasting trip along the east coast up to the Humber, and thence to York. They had great adventures, being taken for pirates at Cromer. However, Taylor completed his trip, and lived to make many more. He was the prototype of the "paper-boat" adventurer, for in 1619 he undertook with a friend to row from London to Queenborough in a "boat made of paper" supported by bladders. It was an unpleasant trip, and but for the bladders they would have drowned; in reality they drifted with the tide most of the way to Queenborough, where the mayor and burgesses turned out and made much of them. Taylor seems to have been of that class of small-boat venturer now generally called "Weary Willies of the High Seas"—men who start on impossible trips with a great flourish of trumpets, as the bold navigator who essayed to cross the Channel on a plank in recent times.

There are many other adventurous voyages of early days which might be quoted. And there must have been many made of which no record has come down to us. The same spirit animates them all: a desire

to go somewhere where no one else has been, or effect the voyage by means or under conditions which no one else has tried. It is the spirit that fires the small-boat or small-yacht sailors of to-day when they clear from port to effect their first crossing of the Channel with a friend, or, maybe, single-handed. There is the charm of the unknown, of fresh ports and new scenes, and, above all, the charm of sailing and navigating waters different from the ordinary, and also, the attraction of a strenuous trip not without its spice of danger.

The number of adventurous voyages which have been made in pleasure vessels is legion—in vessels of all sizes, from a tiny canoe to a full-rigged ship. The most interesting—those which appeal most to the real yachtsman as an expert, and to the general public from their novelty—are those made in small vessels manned by one person or by a crew composed entirely of amateur yachtsmen. A large yacht may make a lengthy cruise in search of adventure, and plenty may be found both by land and sea; but the ship does not enter into the tale so much, and the fact that the yacht is captained and manned by professional sailormen detracts a good deal from the glamour of the tale.

One trip in particular has always exercised a peculiar fascination on modern yachtsmen—to cross the Atlantic in small or moderate-sized craft. Pleasure craft, in the shape of steam yachts or large sailing cruisers, have crossed it times without number; it is no more of a task than bringing a liner or a sailing ship across. But this voyage has not frequently been made in small vessels. One of the earliest attempts on record was that of the much-discussed canoe, *Red*,

White, and Blue, which gave rise to a great deal of talk in the "'sixties". Some believed that she had crossed from America to England, others stoutly denied it. She arrived, however, and was for a time exhibited.

One of the earliest pleasure vessels to cross was an American schooner, famous in her time, the *Cleopatra's Barge*. She sailed from the port of Salem, Mass., in 1817. Her owner, George Crowninshield, passed the summer in the Mediterranean, and sailed home again in the autumn of the same year. The famous schooner yacht *America*, which won the Queen's Cup at Cowes—now better known as the America Cup—sailed across in 1857. She left New York on 21st June, and three weeks and eight hours later anchored at Havre, in France. The earliest record of a small yacht crossing the Western Ocean is from 1866, when the sloop *Alice*, which was only 48 feet on the water-line, was sailed over by Captain A. H. Clark, making the passage from Nahant to the Needles in the remarkably short time of nineteen days.

Another famous crossing was the historic race between the *Henrietta*, the *Fleetwing*, and the *Vesta* (large craft, all of them) in 1866. *Henrietta*, owned by James Gordon Bennett, won, arriving at the Needles in 13 days 21 hours and 55 minutes. *Vesta* was not long behind her, while only forty minutes separated *Vesta* and *Fleetwing*. All the boats sailed what course they pleased. From a racing point of view this was the most wonderful contest that has ever occurred, as the start was made on 11th December, at the outset of the wildest weather conceivable

in the Atlantic, and each owner pledged himself to the extent of 30,000 dollars, making a sweepstake prize fund of nearly £20,000.

Another race took place in 1887, when *Coronet* defeated *Dauntless* in a match from Bay Ridge to Queenstown, sailing over in 14 days 20 hours 30 minutes. They, too, started at a bad time, on 13th March, and had weather of the worst description throughout. *Dauntless* for three days battled with as heavy gales as one could wish to avoid; for 72 hours nothing but cold food of the most portable sort could be eaten on board.

There was a transatlantic race in 1905, but the weather conditions were kindlier than on the two previous occasions. As a race it was uninteresting, on account of the differences in size between the vessels—from an 87-foot cutter to a 240-foot full-rigged ship; still, it was a wonderful test of skill and endurance.

Of still more recent date, two Atlantic crossings stand out prominently. In 1911 Mr. Thomas Fleming Day, an amateur, crossed from New York to Rome in a sailing yawl only 25 feet in length, having two other amateur yachtsmen as companions. Two years later he crossed again from Detroit, in the State of Maine, to Petrograd in a 45-foot motor yacht, again being accompanied by amateurs. These two vessels made splendid passages. As both of them had motors, as auxiliary power in one case and full power in the other, they are referred to elsewhere.

Cruising round the world is a more ambitious effort than crossing the Western Ocean; still, this has been accomplished on more than one occasion by small

craft. Two such voyages of recent years are worthy of note—that of Captain Slocum in the ketch *Slocum*, which he navigated single-handed, and that of Captain Voss in the Indian dug-out canoe *Tillikum*. In the former case the navigator had a seaworthy craft of fair size with the handiest of all rigs; she was some 50 feet long, and contained comfortable accommodation. Being designed to sail with a minimum of attention, her owner, in suitable weather, could trim the sheets and turn in when out of the track lanes of regular steamship lines. The *Tillikum* was a boat of another sort; she was an Indian war canoe, dug out of a solid tree, and some 40 feet in length. Being designed for paddling, she was naturally somewhat "crank" under sail, and needed careful "nursing". She was rigged with three masts, and something after the fashion of a three-masted schooner. The trip was by no means a pleasant one. Starting with "two up", there was disagreement between them, and the mate forsook the ship, leaving Captain Voss to continue his voyage single-handed. Only his experience as a seaman and his knowledge as a full master-mariner enabled him to complete the voyage in his nondescript craft. As in nearly every other case of long-distance small-boat cruises, he made full use of what is known as a "sea-anchor" when caught by rough weather or in a bad tumble of sea. A "sea-anchor" may be described as a sort of jelly-bag made of canvas, the open mouth being attached by a bridle to a warp. When thrown out from the bows it acts as a drag, and keeps the boat head to wind—the best position to meet really bad weather at sea. *Tillikum* made her voyage, and ultimately reached England, where she was sold to a

keen yachtsman, who fitted a small motor into her. She was to be seen not long ago lying on the saltings near Canvey Island.

As a matter of fact, strange as it may appear, there is less risk in crossing a wide stretch of open water than in making a trip of similar length along a coast. Crossing the Atlantic, for instance, is a safer task than coasting round the British Isles. This reasoning will become evident when it is remembered that for every single ship lost out at sea hundreds are lost on shore or on rocks or shoals. A trip round the coast of Great Britain needs great skill and knowledge, as well as daring, if made in a small or moderate-sized craft. One of the earliest and most interesting trips of this kind was made by Lieutenant Middleton in the 'sixties, when he sailed his small yawl *Kate*, a boat similar in type to the yawl *Rob Roy*, owned by "Rob Roy" M'Gregor, who made so many interesting and daring trips in small craft. Middleton started in 1869 from Limehouse—the spot from which so many historic voyages have commenced since the very beginning of British navigation—and circumnavigated the whole of Great Britain. His book contains much advice which is useful to-day.

Reference, however brief, must be made to the voyages made by Mr. E. F. Knight, the great war correspondent. His cruises to the Baltic, in the *Falcon* to South America, and in the *Alerte* searching for a treasure which was never found, are amongst some of the finest ever accomplished. The cruise of the *Falcon* to South America in particular was noteworthy; it is no light task to undertake the navigation of a vessel of some 40 tons on such a trip with an

entirely amateur crew. Mr. Knight rivals the famous M'Mullen in his trips. R. T. M'Mullen will go down to posterity as the prototype of the modern small yachtsman, the beau-ideal of the single-handed sailor. His first trips were made in the half-decked cutter *Leo* from 1850 on to 1857. A larger boat, *Sirius*, followed in 1861. Then came the *Orion* seven years later, followed by the *Procyon* for an experimental cruise. In 1890 M'Mullen built his last boat, the *Perseus*—a 6-ton lugger—and made more notable cruises in her. M'Mullen confined his sailing principally to the waters round the British Isles, and his trips stand out as examples of what may be accomplished by a keen yachtsman in a small vessel. His last cruise was made in 1891, when he set out from Greenhithe single-handed in the *Perseus*. Four days later the vessel was picked up in mid-channel by French fishermen; this fine old sailor was dead. He was sitting in the cockpit with his face turned towards the sky, and the vessel sailing herself, just as he was when his heart failed and death overtook him.

One could write many volumes of the adventures of keen yachtsmen, but those mentioned show the spirit which animates them all, even now, in these days when mechanical propulsion is ousting sail. It will never oust it entirely so far as yachting is concerned. The auxiliary engine is a good friend to the sailing enthusiast, and the majority of present-day yachts are fitted with a motor for use under certain conditions. But the old spirit is still alive, and no real yachtsman will use his engine while the breezes of heaven continue to blow and can be utilized to carry him on his course. There is a skill required in sailing; there is

the effort to make the most of the prevailing conditions. The conditions are never the same, they change from minute to minute, and the yachtsman has to foresee and meet them. When the unforeseen occurs, then he has to act rightly and at once, and so develops a ready self-reliance which will have its effect upon him not only in his sport of sailing, but also in his ordinary life.

When, about 1904, the internal-combustion motor had been brought to such a pitch of excellence that it could be relied upon to run with little attention for long periods without stopping, the building of motor-driven vessels started to become popular, and the installation of a motor instead of a steam-engine—or as auxiliary power on board sailing yachts—opened up new possibilities for yachtsmen wishing to make long cruises in small craft. Sailing yachtsmen found that fitting an auxiliary engine to their vessels enabled them to make much longer cruises than would have been possible under sail alone, and, further, in many cases it allowed them to dispense with the services of that bugbear of all keen small yacht cruisers—the professional sailor or paid hand.

Besides being merely useful in its proper sphere for propelling the yacht in a calm, the auxiliary engine saves an enormous amount of time and labour. Leaving or entering a port with which the yachtsman is unacquainted, the engine can be started and the ship conned in or out in perfect safety and without loss of time. When there is a light head wind blowing and the amateur skipper has to face a weary beat to windward, perhaps with the tide against him, before he can reach the port for which he is bound, the

engine will save him hours and many a weary vigil. In extremely strong winds, too, the motor has its uses. In a gale, when the yacht is forced to lie to, the engine will help to keep her head to wind and prevent her drifting too far, even if no great advance can be made.

Then, again, compared with the steam-engine, the motor offers many advantages all its own. It takes up less room; it requires no stokehold crew—for small and moderate powers the services of a skilled engineer even are not required; and, most important of all, perhaps, a large supply of fuel can be easily carried, and the awkward necessity of having frequently to put into port for coal is avoided. So, with all this, a motor vessel of a certain size can cruise a far greater distance without calling at a port than could a steam-driven craft. It would be an absolute impossibility, for instance, for a 40-foot steam-yacht to cross the Atlantic under her own power and carry her own supply of fuel. Yet a motor-yacht of this length crossed the Atlantic successfully about twelve years ago, with only the captain and his sixteen-year-old son in charge.

The development of the motor-driven vessel is one of the most fascinating chapters in maritime history. It may appear quite a simple matter to the uninitiated to take a motor, build a boat, and put the one into the other. As a matter of fact, the very earliest motor-boats were produced something in this fashion, but they were very far indeed from being a success. In most cases the engines were not of a suitable type for marine propulsion; the hulls were more or less unsuited to stand the strain of a motor drive; and the

vital importance of a whole host of small details could only be grasped after experience had been gained as a result of many failures and many disappointments. Compare the modern touring car with the extraordinary productions of eighteen or nineteen years ago; much the same progress has been made in motor-boating during the past fourteen years. Motors have been improved, made perfectly reliable, and capable of developing a much greater horse-power for a certain weight and certain dimensions. Hulls have been improved to make them better able to stand the strains set up by a high-powered engine driving them at a high speed, and also to make them more easily propelled through the water, so securing an increase of speed without the necessity of installing a higher-powered engine. The motor-boat to-day is totally different from the motor-boat of twelve or fourteen years ago, and voyages are made and speeds accomplished which, in those early days of this comparatively new sport, would have been regarded as the idle dreamings of a fantastic visionary. The Atlantic Ocean has been crossed four times by comparatively small craft; while the fastest boat in the world—a British racing motor-boat—has attained a speed of 60 land miles an hour.

The progress has been gradual, though. One can still remember how the world of yachting was thrilled when a motor-boat crossed the Channel from Boulogne to Folkestone for the first time about 1903. This was a boat of less than 25 feet in length, christened not inappropriately *Amiral Bruix*, after the famous French fighting sailor of that name. And what excitement there was in 1904, when the first cross-channel

race so long talked of became an accomplished fact, and a fine fleet of various types of motor craft set out from Calais one July day to race to Dover!

It was in the same year that one of the most remarkable cross-channel trips was made. The then famous racer, *Trèfle à Quatre*, owned by an Englishman, Mr. E. B. Thubron, was entered to race at the Ostend regatta. Her owner being delayed for some reason or another could not ship the boat over, and decided to take her over under her own power. There was a very fresh south-westerly wind blowing, and for such a light, fast boat quite a heavy sea. She left Dover harbour just about the same time as the Ostend mail packet, and arrived in Ostend some time before the steamer—which shows that her speed must have been well over 20 knots, a performance which would be praiseworthy even now.

There were two trips made in those early days which will ever stand out prominently in history—the voyage of the *Abiel Abbot Low* across the Atlantic, and the non-stop Thames to Shetland cruise made by the British motor-yacht *Napier-Major*. So far as my memory serves, the *Abiel Abbot Low* was some 42 feet in length. The principal object of her voyage across the Atlantic was to prove the advantages of heavy-oil engines for the propulsion of yachts. It would be exaggeration to describe the cruise as a pleasure trip. It was very far indeed from being that. The shiplet was manned by the skipper and his sixteen-year-old son, who worked her over more or less watch and watch: less rather than more, in fact, as the son fell ill, and the captain had many weary, anxious days before she made the port of Falmouth

The engine was built to run on ordinary paraffin instead of petrol, and naturally for so long a trip a relatively enormous supply had to be carried in the ship's tanks. Heavy weather was encountered soon after dropping the American coast, and they carried it all the way across with them. That in itself would not have meant much beyond some slight discomfort, as the captain was a sound, experienced man and had insisted on auxiliary sails being provided, and—like all other men who have made long cruises in small craft—he was alive to the usefulness of a sea-anchor in heavy weather. But with the heavy seas the boat rolled and pitched horribly, and the bulk of paraffin in the tanks strained them and they leaked badly. Imagine living for forty days or more in an atmosphere of paraffin, eating it with every meal and taking it in with everything you drink! For all that the boat was brought through safely. Her speed on the trip was not high, but it is not possible to make a lengthy run of this nature and attain high speeds at the same time.

Napier-Major, for instance, had a working speed of between 6 and 7 knots—about 8 statute miles an hour. But what she lacked in speed she could make up in distance. Eight miles an hour may not sound a great speed, many people even may sneer at it: but "hasten slowly" applies with greater force perhaps to cruising than to anything else, and it is wonderful what a distance one can cover in a 7-knot boat, keeping her running steadily day after day. In give-and-take, rough-and-tumble, long-distance cruising the slower boat has a better chance of keeping her speed up than has a faster vessel. If, for instance, *Napier-*

Major had been required to race, say round the British Isles, against a similar vessel twice her speed, it is almost absolutely certain that under average weather conditions she would have won; simply because her speed would have been pretty well maintained, while no small vessel could keep up 16 knots in anything like "weather", using the word in the sailors' sense.

The wonderful performances of *Napier-Major* on her many long trips were accentuated by the fact that she was on nearly every occasion under the control of amateur yachtsmen. Mr. A. Evans was one of her first "skippers", and later she was in charge of Mr. Hearman; while Mr. Wingfield, well known in connection with the cruising yacht *Gwynfa*, sailed aboard her for several seasons. She was of an essentially suitable type for such long-distance, heavy-weather work; between 45 and 50 feet long, beamy, and with a good draught and full lines, she resembled a fishing boat in shape rather than a conventional motor-driven cruiser. Her engine-power was low, about 25 horse-power, all told. She was not free from the defects inherent to her type, naturally, for being as buoyant as a cork she was exceedingly "lively" in a seaway, and under certain conditions of weather would roll in a way which would upset all but the most seasoned small-yacht sailors. The outstanding feature of her trips was her absolute and unvarying regularity, and for that reason it is difficult to select one trip as being more noteworthy than another.

For sheer reckless daring another trip accomplished during those early days also merits special mention.

That was the single-handed trip undertaken in a 30-foot motor launch from Southampton to London without a stop, and without a starting handle on board. It is no great distance from this south-coast port to London by train, but it is a long way round the coast, and the navigation is, for the most part, of no pleasant description. The launch, *Iris* by name, steered by Mr. H. Halliday, left Southampton one summer evening about six o'clock. After having started the engine, the starting-handle was passed ashore, and the helmsman set forth single-handed on a more risky trip than he himself had imagined possible. In passing through the Looe Channel he had to attend to something forward and slipped overboard, happily managing to catch a life-line along the side. After passing Dungeness it was necessary to go forward underneath the foredeck to set right a leaky petrol pipe. The fumes which had accumulated under the deck induced temporary unconsciousness; realizing, however, that something was going wrong with him, the navigator crawled out from under before losing his senses. Fog was encountered later, and the entrance to the Thames had to be "smelled out" by the use of the lead. Finally about two o'clock in the afternoon of the following day the *Iris* arrived off Gravesend, her navigator half-dead for want of sleep and thickly crusted with a coating of salt and oil.

The idea of accomplishing a long distance afloat under trying or abnormal conditions has always exercised a supreme fascination on yachtsmen of all kinds. That is, doubtless, one reason why long-distance races from one port to another have always had an

irresistible appeal to so many men. The first cross-channel race took place from Calais to Dover in 1904, and proved a great success. The following year a similar race from Boulogne to Folkestone and back was organized. About the same time the great "ocean" race from New York to Bermuda was initiated. At the time, this was the longest course ever set for a power-boat race. It has been a regular fixture ever since, and, so far, there has not been a single accident to record in any of the races over this 400-mile course. The race owed its inception to the efforts of Mr. Thomas Fleming Day, who, in America, has been preaching for many years the advantages and attractions of such long-distance port-to-port courses over the ordinary racing, "three times up and down and round the buoy".

The race to Bermuda proved such a success that Mr. Day thought it feasible to suggest a contest for small craft across the Atlantic, and—as on previous occasions—he expressed his willingness to build a boat specially for such a contest and race her across himself, with the assistance of a crew composed entirely of amateur yachtsmen. In 1906 the Royal Ostend Yacht Club had practically completed all the preliminaries for such a contest when it was found necessary to abandon them, largely in view of a transatlantic yacht race then being mooted. The idea remained in abeyance until 1911, when the Italian Touring Club organized their racing cruise round Italy from Venice to Rome. Acting on the suggestion of its British representative, Mr. John W. Ward, the Italian Touring Club obtained a handsome cup from the King of Italy for a race from New York to Rome,

with other unusually good prizes in addition. Mr. T. F. Day had a 25-foot auxiliary yawl, *Seabird*, specially built, and with two amateur companions successfully made the trip. Starting from New York in June, their first port of call was Horta, in the Azores, where they took in stores and replenished the fuel supply for the small auxiliary engine. From Horta they made a straightway passage to Gibraltar. Owing to headwinds they were delayed somewhat on this portion of the trip, and in order to reach Rome in time for certain special festivities their ship was hoisted to the davits of a man-of-war and conveyed to Naples. From this port they made their way under their own power to the mouth of the Tiber and up to Rome itself.

The trip was noteworthy for several reasons: on account of the small size of the vessel—25 feet length does not offer much accommodation for three grown men during a passage occupying several weeks—and also because the crew aboard were exclusively "amateur" yachtsmen in the accepted sense of the word. On this trip, although the small 3-horse-power engine was not used very much, it proved absolutely invaluable on occasion. Full use, too, was made of the indispensable sea-anchor. Apart from the slight discomforts inevitable when three men live together in cramped quarters for a long time without the possibility of getting exercise—the lack of which can have a wearing effect upon the temper—the trip was made easily and with no danger.

Two years later Mr. Day again crossed the Western Ocean, this time in a 45-foot motor-cruising yacht, the *Detroit*. On this trip sails were carried as

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THE STORY OF THE CABLE

A Cable-buoy just ready for letting go.

Chapter IX

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THE STORY OF THE CABLE

Two aspects of laying a shore end. The top illustration shows employees of the Cable Company at work in the Caroline Islands; the picture beneath shows United States Marines laying the shore end at Guam, Ladrone Islands.

auxiliaries, to be used only in the event of a breakdown happening to the motor. Partly on account of the nature of the boat and partly on account of vicious weather all across the Atlantic, this trip was far from being as pleasant or as comfortable as that previously made in the smaller *Seabird*. Again the navigating crew was entirely composed of amateurs, though a professional engineer was shipped to be responsible for the good working of the engines. Queenstown was the first British port entered after leaving New York; thence the *Detroit* proceeded to Falmouth, and then on to Ostend. Finally she went up the North Sea and through the Baltic as far as Petrograd.

It is interesting to note that those on board preferred the Atlantic in nasty weather to the North Sea under similar conditions. The North Sea, particularly that portion of it between the British east coast and the coasts of Belgium and Holland, is certainly as nasty a place as any sailor would wish to avoid in heavy weather. The sea runs short, hollow, and generally uncomfortable, and owing to the shoal water rises the moment the wind springs up. The tides, too, are strong and somewhat tricky.

But in racing many a short trip can be as trying and as fraught with danger as, say, a cruise across the Atlantic. Take for instance our favourite British class of racing motor-boats—the British Motor Boat Club's 21-footer class. These little vessels are only 21 feet long, and are driven by engines developing as much as 60 or 70 horse-power, propelling them at a speed of over 30 knots. They are generally raced single-handed by their owners, who have to race, steer, and look after the engines while the vessel is travelling at

over 35 land miles an hour. It is a supreme test of strength, endurance, and skill.

Yet strangely enough accidents are very rarely recorded. Both motor-boating and yachting must rank as the safest sports known. Perhaps it may be because the demands made upon a man are so stringent, by the very nature of the sport, that only those who have a real inborn aptitude for it remain in it. The usefulness of the sport cannot be denied; apart from the pleasure it affords, it brings out all that is best in a man's character and develops reliance and resource. When the European war broke out there was an immediate rush of motor-boat owners and yachtsmen to offer their boats and their services to the Admiralty. Most of them were accepted and did invaluable work under conditions which might have turned them cold to think of had they to anticipate them in a pleasure trip. When the full value of the services they rendered is known, it is certain that their cruises will put many seemingly more adventurous voyages in the shade. It is the effect of the old spirit which still flourishes; the spirit which animated our early voyagers; which sent our Elizabethan navigators to sea, and impelled our Merchant Venturers to build this mighty empire. These of our day who go down to the sea in small ships—these our Knights of the Joyous Venture—are of the same make as they who ventured boldly forth into the unknown, long centuries ago, even though their means of propulsion be more complex.

CHAPTER IX

The Submarine Cable

NOT so very long ago overland distances were annihilated, once and for all, by the invention and universal adoption of the electric telegraph. Before that time many different kinds of signals had been used for the rapid transmission of messages. Beacon fires belonged to a time when one message, and one only, needed to be sent with the greatest swiftness—the call to arms; but beacons, being capable of interpretation only when one knew what message to expect, were not of general utility. Thus there arose the system of signalling by semaphores, human or otherwise, which worked efficiently in daylight and clear weather only; and the ringing of gongs and bells and other noise makers.

The electric telegraph rose above all the disadvantages of these unreliable signals. It was efficient by day and night, fair weather or foul; could not be tampered with except after much elaborate scheming, and was, for those days, incredibly swift in its operation. But its usefulness was limited entirely to land work. The ocean still separated nations and prevented any communication more rapid than that effected by the fastest boats. When we come to consider the enormous number of messages now sent daily by means of

the submarine cables, we shall have some slight idea of the value which this engineering feat bears to the civilized world; but we need to know the whole story of the submarine cable before we can grasp the magnitude of the work. Still, we must not lose sight of the fact that, important as the submarine cable is to us to-day, it is only a passing convenience. The spirit of Innovation, which some call Change and others call Progress, is stirring the whole world, and with the coming years the wireless telegraph and wireless telephone assuredly will entirely supersede the old, clumsy, expensive, and comparatively fragile cable.

Though few more than sixty years have elapsed since the first submarine telegraph line was laid, the possibility of such an achievement had been clear to a few advanced minds for a long time. The first experiments of which any authentic record remains were made across a river that has since become famous from a widely different cause—the river Marne in France. The experimenter was named Aldini, and in the year 1803 he successfully sent messages along a wire laid on the bed of the Marne. This Aldini, by the way, was a nephew of the celebrated anatomist, Luigi Galvani, whose studies upon the subject of animal electricity were of such infinite importance, and whose name has been perpetuated in the word *galvanism*. In 1811 two enthusiasts, Sömmering and Schilling, established communication between the banks of the Isar by a subaqueous wire. Their exploits are worth mentioning, since they were the first experimenters to make use of india-rubber to insulate the wires. A matter of such vital importance could not be overlooked, and soon all the great scientific

minds of two continents were occupied with the question of submarine telegraphy. Sir William O'Shaughnessy Brooke, F.R.S., Colonel Pasley, R.E., Sir Charles Wheatstone, F.R.S., and Professor F. B. Morse are a few of the many Britons and Americans who laboured during the first half of the nineteenth century to annihilate the distance of the sea.

The year from 1845 to 1846 was marked by two achievements: one by the Americans, when Ezra Cornell laid 12 miles of cable from Fort Lee to New York; and the other by the British, in the person of Charles West, who put down a wire in Portsmouth harbour, and would have carried it on to France but for lack of funds. Cornell's cable worked well for several months, but was broken by ice when the winter set in. Yet the public, which, as a whole, was even more stupid and pigheaded than it is to-day, refused to be persuaded of the feasibility of the scheme to connect England and France by submarine cable. This incredulity was largely due to ignorance, for the majority of persons believed that messages were sent by a series of jerks upon the line, such as an impatient visitor might give to your door-bell. "No, no," said the wiseacres, "we know better than to believe such a tale as that. 'Tisn't as if the sea bottom was smooth, because 'tisn't. 'Tis all lumpy, and what wire's going to stand being jerked over twenty-one miles of rock?" Well, well, my grandfathers, you were clever men in your day, and possibly I am just as stupid in mine, so we will have done with revilings. However, the story of the Boulogne fisherman is too good to be left out.

A poor fisherman of Boulogne was returning homewards one evening, trawling as he went, for he had had a day of bad luck. Presently to his joy he felt his trawl become heavy, and with all caution he began to haul in, only to find his trawl entangled in seaweed. "This dratted seaweed!" he ejaculated—or the French fisherman's equivalent for dratted—and forthwith began to throw it back into the sea. But then he paused, for the weed was like no other he had ever seen, and where his hook had cut it there was a gleam of gold. Trembling with excitement he made for the shore, eager to examine his catch more thoroughly. But his delight was short-lived, for when he reached the shore they told him that his "weed" was the submarine cable which had been in working order for the first time that afternoon, and had carried a message of congratulation from Great Britain to Louis Napoleon Bonaparte!

The disappointing adventure of the poor Boulogne fisherman disgusted the capitalists who had found the money for the cable, and delayed further enterprise in the matter for some years. However, in 1851 a line from the South Foreland to Sangatte was laid with perfect success, mainly through the energy of Mr. T. R. Crampton, who subscribed half the capital, and interested other important people in the project. Two years later followed a line between Portpatrick in Scotland and Donaghadee, an undertaking which was carried out after many defeats and disappointments by Sir Charles Bright. These lines proved eminently practical, and established beyond all question the value and utility of a submarine telegraph system, so that within a few years Great Britain

was connected with Holland and Germany by this means, and cables also were in operation between Denmark and Sweden, Italy, Corsica, and Sardinia, and Sardinia and northern Africa. The work in the Mediterranean was more difficult than any that had been attempted hitherto, owing to the greater depth of water; but it was accomplished finally after various difficulties and delays. But the ambitious spirits of the Submarine Telegraph Company, and their kindred in America, regarded all these lines, important though they undoubtedly were, as so much practice and preparation for the great end they had in view.

This end, of course, was the Atlantic cable, but the world was not prepared for such a colossal undertaking. In the early 'fifties little was known of any of the sea bed, and nothing at all of the depths of the Atlantic, while the possibilities of electricity were imperfectly grasped by a few and unthought of by the great majority. The longest length of cable which had been laid up to that time was only 110 miles, at an average depth of 30 fathoms, and "imagination boggled" at the bare idea of submerging 2000 miles of cable in an ocean of profound abysses. In 1856, however, the expeditions of H.M.S. *Arctic* and H.M.S. *Cyclops* proved the existence of a "gently undulating plateau extending the whole distance between Ireland and British North America". This plateau occurred at an average depth of 2½ miles, and in the opinion of Lieutenant M. F. Maury, U.S.N., who prepared a report upon the subject, was "apparently placed for the express purpose of holding the wires of a submarine telegraph and keeping them out of harm's way". Although Lieu-

tenant Maury's report was not concerned officially with the projected cable, he obviously could not resist the temptation to touch upon the subject, and concluded his report with the following words: "I do not, however, pretend to consider the question as to the possibility of finding a time calm enough, the sea smooth enough, a wire long enough, or a ship big enough to lay a coil of wire 1600 miles in length". About the same time the experiments of Faraday and the Bright brothers had added greatly to their knowledge of the ways and habits of electricity. In spite of this advance the Astronomer Royal, Professor Sir G. B. Airy, F.R.S., declared that "it was a mathematical impossibility to submerge a cable in safety at so great a depth", and also that "if it were possible, no signals could be transmitted through so great a length".

You see, the stories of great developments or great innovations are always the same. Flights of genius always meet with chilling clouds of opposition and incredulity, but sooner or later the desired height is attained, if not by one aspirant, then by another. The saviour of the Atlantic cable was an American, Cyrus W. Field, a man who, knowing nothing of electricity or physics, but possessed of great shrewdness and business ability, saw in the project the possibilities of a sound commercial undertaking. As a preliminary, therefore, he acquired "landing rights" all along the coast of British North America—that is to say, only by his permission could a sub-Atlantic cable be brought to shore on that coast—for a period of fifty years. Thus provided, Mr. Field came over to England with the object of "making a deal" with

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THE STORY OF THE CABLE

Laying a shore end in Newfoundland. The Cable is floated ashore on casks. Note the icebergs in the vicinity.

Chapter IX

those Britons whom he knew to be keenly interested in the matter. Accordingly he at once entered into negotiations with John Watkins Brett, whom he had met before in connection with the Gulf of St. Lawrence cable, and Charles Bright, who had laid the Portpatrick-Donaghadee line. His efforts resulted in an agreement, couched in the following terms:—

"*26th September*, 1856.

"Mutually, and on equal terms, we engage to exert ourselves for the purpose of forming a company for establishing and working of electric telegraphic communication between Newfoundland and Ireland, such company to be called the Atlantic Telegraph Company, or by such other name as the parties hereto shall jointly agree upon.

"John W. Brett.
"Charles T. Bright.
"Cyrus W. Field."

Two things only remained to be done, but they were of the greatest importance. First, Government permission and, if possible, Government subsidies had to be obtained; and secondly, money and shareholders were required. The matter of designing and making the cable was one which could be left to the electrical adviser, Professor Thomson, afterwards Lord Kelvin, and the electrician, Edward Orange Wildman Whitehouse. Fortunately the two Governments concurred, after much deliberation, in the utility of being able to send messages to one another in the course of a few minutes, and promised a small subsidy in exchange for free use of the wires. The company

was registered on 20th October, 1856, under the name of the Atlantic Telegraph Company, with a required capital of £350,000. The company, however, was to be run on an entirely novel plan, and one which commends itself to my humble intelligence. It boasted of no prospectus, no promotion money, no brokers nor commissions, was not advertised, and had, to begin with, no board of directors or executive officers. The projectors were to receive no remuneration whatever until after the shareholders had been paid a dividend of over 10 per cent, when they would divide the surplus equally between them.

The first meeting of this great enterprise was held in Liverpool, where were the head-quarters of the Magnetic Company, on 12th November, 1856. The gathering included professional and business men of all kinds, representing the wealth and influence of Liverpool and many other commercial centres, who had attended in response to circulars printed on half-sheets of note-paper issued by Edward Bright, manager of the Magnetic Company, and brother of Charles. Such was the success of this meeting, and others held at Manchester and Glasgow, that the whole amount was raised in a few days in the form of three hundred and fifty £1000 shares. Mr. Field had retained shares to the extent of £75,000 for the benefit of his compatriots, but to his intense disgust the ardent interest of Americans in the project was not sufficient to lead them to invest money in it, and only with very great difficulty could they be persuaded to take any shares at all. Eventually £27,000 was subscribed on the other side of the Atlantic, the company thus remaining practically in the hands of the Magnetic

Company. Indeed, the first board of directors of the new Atlantic Company, elected in December, 1856, included nine men who were also directors of the Magnetic Company.

Work now began actively, Cyrus Field being general manager of the concern, Charles Bright engineer-in-chief, and Wildman Whitehouse electrician, as already mentioned. The value of the support given by Professor Thomson to the undertaking cannot be exaggerated, while his connection with it undoubtedly conferred lasting benefits on humanity as a whole. It was during the two years following the inception of the company that Professor Thomson began to carry out the experiments which resulted in his invention of the mirror galvanometer and signalling instrument. This instrument rendered comprehensible the slightest—"most attenuated" is the proper expression — of electrical impulses, and proved of infinite importance in the early days of the Atlantic cable. However, to begin with, too little deference was paid to the genius of both Professor Thomson and Charles Bright, who accordingly came into collision with the hard-headed directors at an early stage in the proceedings.

The work of constructing the cable was begun in February, 1857. The length required was estimated to be 2500 nautical miles, the distance between the two landing-points—Valentia and Trinity Bay, Newfoundland—being 1640 nautical miles. The cable consisted of a strand of seven copper wires weighing 107 lb. per nautical mile, insulated with three coatings of gutta-percha weighing 261 lb. per nautical mile. This cable, though stouter and stronger than any electric

cable that had been made previously, was not, in the opinion of Charles Bright and Professor Thomson, strong enough for the tremendous strain assigned to it. Unfortunately the board of directors objected to the greater expense of the larger cable, quoting, to support their arguments, the report of Morse, that "large coated wires used beneath the water or the earth are worse conductors — so far as velocity of transmission is concerned—than small ones"; and of Faraday, that "the larger the wire, the more electricity was required to charge it; and the greater was the retardation of that electric impulse which should be occupied in sending that charge forward". Another unfortunate circumstance was the short time in which the company stood pledged to carry the work through, and after insufficient tests and experiments had been made, orders were given to various firms to supply the parts of the cable as soon as possible. The iron sheathing was made partly by Messrs. Glass, Elliot & Co., of Greenwich, and partly by Messrs. R. S. Newall & Co., of Birkenhead. This armour was composed of eighteen strands, each consisting of seven iron wires, and proved expensive and unsatisfactory. The sheathing for the shore ends of the cable, both landing-places being rocky, was heavier still. Altogether the vast amount of 340,500 miles of iron and copper wire were employed, and had to be drawn and laid up in the space of four months, a colossal task which cost the moderate sum of £225,000. The bill for an Atlantic cable to-day runs into half a million of money.

The making of the cable was not the only thing to be done, for special ships provided with special

machinery were needed. It is true that the company had the assurance of a naval expert that "no other machinery for paying out was necessary than a handspike to stop the egress of the cable"; but he was not correct in his view, and the paying-out machine was really a complicated affair.

To make a long story short, the manufacture of the cable was hurried through, the British Government lent a warship, the *Agamemnon*, and the United States Government lent the finest frigate of their Navy, the *Niagara*, while the U.S. paddle frigate *Susquehana*, H.M.S. *Leopard*, and H.M. sounding-vessel *Cyclops* were also detailed to take part in the expedition. The "Wire Squadron", as it was nicknamed, was somehow made ready by the end of July, and a large staff of experts was assembled to superintend the laying of the cable. Charles Bright, Samuel Canning, William Henry Woodhouse, F. C. Webb, and Henry Clifford, all of them famous for their work in connection with early cable-laying, formed the engineering staff; and the electrical staff included names equally prominent. Mr. Whitehouse was unable to go on account of his indifferent health, and Professor Morse, who attended on behalf of the United States Government, was prevented by circumstances over which he had no control—not altogether unconnected with the motion of the ship—from appearing on deck throughout the voyage. Correspondents to the *Times*, *Daily News*, and *New York Herald* were also to make the voyage. The departure of the *Agamemnon* from Greenwich was made the occasion of elaborate festivities, a banquet being held on board, to which all the workmen from Glass

& Elliot's factory, with their wives and families, were invited. The vessels arrived in Valentia Bay on 4th August, where they fell in with the two happily-named boats which were to assist in landing the shore end of the cable—H.M. tender *Advice* and the steam-tug *Willing Mind.*

August 5th, 1857, was a great day for the neighbourhood of Valentia Bay. Throngs of people from miles around flocked to the harbour, for not only was this wonderful cable to be landed, of which everyone had heard so much and few knew anything at all, but the Lord-Lieutenant himself was to be there to receive it. Fortunately the weather was fine, and the Lord-Lieutenant, with his staff, the directors of the railway and telegraph companies, and the other big-wigs who honoured the function with their presence, derived no ill effects from their long wait on the beach. At last, at half-past seven in the evening, the sailors and officers from the *Niagara* and *Susquehana* came plunging through the surf with the hawser and formally presented the cable to His Excellency. No doubt there was some little speechifying and making of compliments, then a hush while the vicar of the parish asked the blessing of the Almighty upon the enterprise, and then an adjournment for feasting, dancing, and general merrymaking.

Very early the next morning the ships steamed away. Mr. Bright's wish had been that operations should be begun at a point half-way between the landing-places. The directors, however, were so much taken with the idea of being able to communicate with a ship throughout the whole of a voyage across the Atlantic that they decided that the *Niagara*

should pay out her portion of the cable first, starting from Valentia, and that the splice should be made and the *Agamemnon* begin her work in mid-ocean. The incidents of the voyage have been recorded in graphic style by Mr. Henry Field, brother of Cyrus.

"All through that night (August 6th), and through the anxious days and nights that followed, there was a feeling in the heart of every soul on board, as if some dear friend were at the turning-point of death, and they were watching beside him. There was a strange unnatural silence in the ship. Men paced the deck with soft and muffled tread, speaking only in whispers, as if a loud or heavy footfall might snap the vital cord. So much had they grown to feel for the enterprise, that the cable seemed to them like a human creature, on whose fate they themselves hung, as if it were to decide their own destiny.

"There are some who will never forget that first night at sea. Perhaps the reaction from the excitement on shore made the impression the deeper. There are moments in life when everything comes back to us. What memories cropped up in those long night hours! How many on board that ship, as they stood on the deck and watched that mysterious cord disappearing in the darkness, thought of homes beyond the sea, of absent ones, of the distant, and of the dead!

"But no musings turned them from the work in hand. There were vigilant eyes on deck—Mr. Bright, the engineer-in-chief, was there; also, in turn, Mr. Woodhouse and Mr. Canning, his chief assistants. . . . The paying-out machinery did its work, and though it made a constant rumble in the ship, that dull, heavy sound was music in their ears, as it told

them all was well. If one should drop asleep, and wake up at night, he had only to hear the sound of the 'old coffee mill', and his fears being relieved he would go to sleep again. . . .

"Every moment the current was passing between ship and shore. The communication was as perfect as between Liverpool and London or Boston and New York. Not only did the electricians telegraph back to Valentia the progress they were making, but the officers on board sent messages to their friends in America, to go out by the steamers from Liverpool. The heavens seemed to smile on them that day. The coils came up from below the deck without a kink, and unwinding themselves easily, passed over the stern into the sea.

". . . On Monday (10th) they were over two hundred miles at sea. They had got far beyond the shallow waters off the coast. They had passed over the submarine mountain that figures on the charts of Dayman and Berryman, and where Mr. Bright's log gives a descent from 550 to 1750 fathoms within eight miles. Then they came to the deeper waters of the Atlantic, where the cable sank to the awful depths of 2000 fathoms. Still the iron cord buried itself in the waves, and every instant the flash of light in the darkened telegraph room told of the passage of the electric current.

"Everything went well till 3.45 p.m. on the fourth day out (Tuesday, the 11th August), when the cable snapped after 380 miles had been laid, owing to mismanagement on the part of the mechanic at the brakes."

This laconic announcement, all the more noticeable

on account of the elaborate paragraphs preceding it, conveys to us in fullest detail the grievous nature of the occurrence. We can imagine the grinding of the "coffee mill", grown so familiar as to seem a natural accompaniment of life and not the mere noise of a machine, filling the sleepy afternoon, everything going on just as it should, no anxiety anywhere, and then suddenly—the noise was gone. The grinding had stopped.

The cable had broken. Four months' work and 380 miles of cable were wasted. "The mechanic at the brakes" accused by Henry Field of the responsibility of the disaster must have had an unhappy time. We do not hear what became of him; but if I had been he, I should undoubtedly have followed the cable, and hidden myself beneath 2000 fathoms of Atlantic. The real reason of the disaster, however, may be found in the insufficiency of the expert staff. Much had to be done, much had to be supervised, and in first days of attempt everyone, particularly those in command, lived upon a rack of nervous irritability. You must remember that although trials with this particular kind of cable and paying-out machine had been made before the Wire Squadron assembled in Valentia Bay, they had not been made in the Atlantic. Only short lengths had been experimented with, in comparatively shallow waters, and the vast proportions of cable on board the *Niagara*, and the enormous depths to which it was sunk, provided new and untried conditions. Moreover, wind, sea, and the speed of the ship were all factors to be considered, it being necessary to pay out the cable at a speed slightly above that of the

ship. Thus, up to the morning of the 10th, a retarding pressure of 7 cwt. was enough to hold the cable in check, but when the greater depths of the ocean were reached this pressure had to be increased to 20 cwt. Then the wind began to rise and with it the sea, consequently the pressure was increased again to as much as 35 cwt. What happened then can be understood most clearly from the following paragraphs taken from Mr. Bright's report to the board of directors:—

"I had up to this attended personally to the regulation of the brakes, but finding that all was going on well, and it being necessary that I should be temporarily away from the machine—to ascertain the rate of the ship, to see how the cable was coming out of the hold, and also to visit the electrician's room—the machine was for the moment left in charge of a mechanic, who had been engaged from the first in its construction and fitting, and was acquainted with its operation.

"In proceeding towards the fore part of the ship I heard the machine stop. I immediately called out to relieve the brakes, but when I reached the spot the cable was broken. On examining the machine—which was otherwise in perfect order—I found that the brakes had *not* been released, and to this, or to the hand wheel of the brake being turned the wrong way, may be attributed the stoppage and consequent fracture of the cable.

"When the rate of the wheels grew slower as the ship dropped her stern in the swell, the brake should have been eased. This had been done regularly whenever an unusually sudden descent of the ship

temporarily withdrew the pressure from the cable in the sea. But owing to our entering the deep water the previous morning, and having all hands ready for any emergency that might occur there, the chief part of my staff had been compelled to give in at night through sheer exhaustion, and hence, being short-handed, I was obliged for the time to leave the machine without, as it proved, sufficient intelligence to control it.

"I perceive that on the next occasion it will be needful, from the wearing and anxious nature of the work, to have three separate relays of staff, and to employ for attention to the brakes a higher degree of mechanical skill."

So ended the first attempt, which, nevertheless, proved incontestably that the laying of a cable on the floor of the Atlantic was possible. The ships, after the disaster, made for Plymouth, where there was plenty of accommodation for the unused cable, the season being too far advanced for another expedition to be made before the following spring. Mr. Bright, however, pluckily went off to Valentia Bay in a small paddle-steamer, and succeeded in raising 50 miles of the sunken cable. He then had the shore end marked with buoys, in order that a splice might be made without delay at the next attempt. But before anything further could be done it was necessary to appeal for more money, and this, as usual, raised a storm of protest from the shareholders. Many who had been ardent supporters of the project from the first now became equally ardent detractors. It was described as a "fantastic dream", a "romantic adventure"—one that could never succeed. "No sense in throwing

good money after bad" became a most popular saw during the latter days of 1857, and one which poor Bright and his friends must have hated with a deep, enduring hatred. But somehow, by hook and crook, another £100,000 was collected, 700 miles of new cable were ordered, and a paying-out machine of improved pattern was designed. The month of May, 1858, was employed in making valuable experiments in the Bay of Biscay at a point about 120 miles north-west of Corunna, where the water reaches a depth of 2530 fathoms. Considering that the cable used in these practices was some that had been condemned as defective, the result of the operations was deemed quite satisfactory.

It was on the 10th of June, 1858, that the Wire Squadron left Plymouth for its second expedition. This time work was to be begun in mid-Atlantic, according to Mr. Bright's original plan, the *Agamemnon* making towards Valentia and the *Niagara* towards Newfoundland. Everything pointed to a prosperous voyage, for the barometer was high and June is the best month for the Atlantic. But it is a rash man who puts his faith in barometers. 12th June came in with a breeze which rapidly increased to a gale, a mist adding to the unpleasantness of the weather. The conditions would have been characterized as "dirty" in ordinary circumstances, but for the Wire Squadron—the *Agamemnon*, remember, carried a dead weight of 250 tons in her fore-part—they were disastrous. As before, the *Agamemnon* had a representative from *The Times* on board, and the situation gave him material for copy of a thrilling nature, as the following extracts show:—

"Our ship, the *Agamemnon*, rolling many degrees —not everyone can imagine how she went at it that night—was labouring so heavily that she looked like breaking up.

"The massive beams under her upper deck coil cracked and snapped with a noise resembling that of small artillery, almost drowning the hideous roar of the wind as it moaned and howled through the rigging, jerking and straining the little storm-sails as though it meant to tear them from the yards. Those in the improvised cabins on the main deck had little sleep that night, for the upper deck planks above them were 'working themselves free', as sailors say; and beyond a doubt they were infinitely more free than easy, for they groaned under the pressure of the coil with a dreadful uproar, and availed themselves of the opportunity to let in a little light, with a good deal of water, at every roll. The sea, too, kept striking with dull, heavy violence against the vessel's bows, forcing its way through hawse-holes and ill-closed ports with a heavy slush; and thence, hissing and winding aft, it roused the occupants of the cabins aforesaid to a knowledge that their floors were under water, and that the flotsam and jetsam noises they heard beneath were only caused by their outfit for the voyage taking a cruise of its own in some 5 or 6 inches of dirty bilge. Such was Sunday night, and such was a fair average of all the nights throughout the week, varying only from bad to worse."

The following day the situation really became critical. Not only had the gale attained a terrifying height, but the whole ship had been badly strained

by the weight of the coils. But this was not the whole of the trouble. The coils occupied several of the coal bunkers, and the coals, in consequence, had to be stored in various unusual parts of the decks. What the result was we learn from our friend, *The Times* correspondent:—

"At 4 a.m. (20th June) sail was shortened to close-reefed fore and maintop sails and reefed foresail—a long and tedious job, for the wind so roared and howled, and the hiss of the boiling sea was so deafening that words of command were useless, and the men aloft, holding on with all their might to the yards as the ship rolled over and over almost to the water, were quite incapable of struggling with the masses of wet canvas, that flapped and plunged as if men and yards and everything were going away together. The ship was almost as wet inside as out, and so things wore on till eight or nine o'clock, everything getting adrift and being smashed, and everyone on board jamming themselves up in corners or holding on to beams to prevent their going adrift likewise. At ten o'clock the *Agamemnon* was rolling and labouring fearfully, with the sky getting darker, and both wind and sea increasing every minute. At about half-past ten o'clock three or four gigantic waves were seen approaching the ship, coming slowly on through the mist nearer and nearer, rolling on like hills of green water, with a crown of foam that seemed to double their height. The *Agamemnon* rose heavily to the first, and then went down quickly into the deep trough of the sea, falling over as she did so, so as almost to capsize completely on the port side. There was a fearful crashing as she lay

over this way, for everything broke adrift, whether secured or not, and the uproar and confusion were terrific for a minute, then back she came again on the starboard beam in the same manner, only quicker and still deeper than before. Again there was the same noise and crashing, and the officers in the ward room, who knew the danger of the ship, struggled to their feet and opened the door leading to the main deck. Here, for an instant, the scene almost defies description. Amid loud shouts and efforts to save themselves, a confused mass of sailors, boys, and marines, with deck buckets, ropes, ladders, and everything that could get loose, and which had fallen back again to the port side, were being hurled again in a mass across the ship to starboard. Dimly, and only for an instant, could this be seen, with groups of men clinging to the beams with all their might, with a mass of water, which had forced its way in through ports and decks, surging about, and then, with a tremendous crash, as the ship fell still deeper over, the coals stowed on the main deck broke loose, and smashing everything before them, went over among the rest to leeward. The coal-dust hid everything on the main deck for an instant, but the crashing could still be heard going on in all directions, as the lumps and sacks of coal, with stanchions, ladders, and mess-tins, went leaping about the decks, pouring down the hatchways, and crashing through the glass skylights into the engine-room below. Still it was not done, and, surging again over another tremendous wave, the *Agamemnon* dropped down still more to port, and the coals on the starboard side of the lower deck gave way also, and carried everything before them.

Matters now became serious, for it was evident that two or three more lurches and the masts would go like reeds, while half the crew might be maimed or killed below. Captain Preedy was already on the poop, with Lieutenant Gibson, and it was 'Hands ware ship!' at once, while Mr. Brown, the indefatigable chief engineer, was ordered to get up steam immediately."

This manœuvre was performed with great difficulty, for the confusion on board was extraordinary. Everything that could break loose was rolling about, many of the crew were injured, some of them being scalded by the soup which had poured out of the galley coppers, the officers could not make themselves heard, and the men were unable to keep a footing on the deck, such was the tossing of the vessel. However, it *was* performed, and the *Niagara* then came up to offer assistance. The ships returned to the course at about six o'clock in the evening, it being "as wild and wicked a night as ever taxed the coolness and courage of a sailor". The rest of the story of this storm, which lasted a whole week, reads like a nightmare. The stokehole of the *Agamemnon* was flooded, so that the men could hardly work, the deck coil of the cable was loose, and 50 miles of it had got hopelessly entangled, forty-five men were on the sick-list, and the ship herself was so strained and battered that it seemed hopeless to expect her to last long. One thing occurred which may strike us as comic, though probably it added to the horror for those on board. Part of the equipment of the ship consisted of several barrels of sulphate of copper, which, when the barrels were smashed by a heavy

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Photo. Gibson & Sons, Penzance

GIANT WAVES BREAKING OVER A VESSEL

sea, floated about and turned everything it touched a pale, sickly green.

Calm came at last, and when the *Agamemnon* finally met her companions at the appointed rendezvous, the sea was as still as a lake. But the spirits of the adventurers had been damped effectually. The cable was spliced and lowered in gloomy silence, and the two ships parted company and made for their respective destinations. Before they had gone 3 miles the cable broke and a new splice had to be made, after which all went well. The machine worked beautifully, and a certain amount of relief began to be felt on board, only to be lost again when the cable parted after 40 miles had been paid out. This disaster was all the more acute since no reason could be found for it, except the uncomfortable suggestion that these depths of the ocean might be strewn with sharp rocks. Yet another return to the meeting-place was made, the *Niagara* and *Agamemnon* agreeing that, if a break occurred after 100 miles had been laid, all ships should proceed at once to Queenstown and there hold a consultation.

As it happened, everything worked satisfactorily, and messages passed between the two ships constantly until 109 miles of cable had been laid, when "continuity" suddenly ceased. This was so little over the appointed length that the *Agamemnon*, whose motto surely was *Nil desperandum*, sailed back to the rendezvous in the hope of meeting the *Niagara*, and making another splice. But the *Niagara* had already set out for Queenstown, and was there with her tale of disaster a week before the *Agamemnon* arrived. Poor Mr. Bright had therefore to face a

board of directors ready primed with facts, which we may be sure had not been modified, and at the meeting which ensued many bitter things were said. But the three projectors of the undertaking, supported by Professor Thomson, Mr. Curtis Lampson, and Mr. Stuart Wortley, all pleaded for another attempt to be made at once. Fortunately for everyone concerned, and for us all, they prevailed, and only five days after she had returned there the *Agamemnon* left Queenstown with the rest of the Wire Squadron, for the same spot in mid-ocean which had witnessed her former trials.

Nobody took any interest in the business this time. The two ends of cable were spliced and pitched overboard in the most casual fashion, a 32-lb. shot replacing the official sinker, which had fallen overboard. This voyage was destined to present a variety of incidents, keeping the operators alternating between hope and despair. Soon after the start, the cable appeared to be in imminent danger, for a large whale was seen gambolling and disporting quite close to the ship. It did actually graze the cable, but moved off without doing any damage. The next alarm was caused by the discovery of a fault in the cable, about a couple of miles from the machine, and everyone was on thorns until this was patched up. Dismay was occasioned throughout this voyage by sudden stoppages of continuity, which afterwards were found to arise from a fault in the coil in the ward-room of the *Niagara*, but fortunately these stoppages were never of very long duration. Up to 31st July the weather continued good, but on that day a storm came up which, while it did not compete with the famous

storm encountered previously, still gave a great deal of uneasiness. Another morning, an American barque nearly wrecked the whole business by attempting to cross the stern of the *Agamemnon*. But the guns of the energetic *Valorous* barked and boomed at her so determinedly that she thought better of it and hove to.

It was in the dawn of August 5th, exactly a year after the first venture had been begun, almost the very date, too, on which Columbus sailed from Spain on his great adventure, that the *Agamemnon* came safely to harbour in Valentia Bay. A little later a message came through the wire to the effect that the *Niagara* was also preparing to land her cable. The *Agamemnon* came in quietly, no one knowing or caring who or what she was—a very different reception from that which she had promised herself a year ago. However, when she made herself known, the delight and enthusiasm of the neighbourhood knew no bounds, while Mr. Bright's modest telegram to his directors: "The *Agamemnon* has arrived at Valentia, and we are about to land the end of the cable", was received with overwhelming amazement. It is good to think, however, that the amazement swiftly gave way to jubilation, and that Bright and his staff were lauded and petted and banqueted to their hearts' content, probably beyond it. Charles Bright, still only a young man of twenty-six, was very properly rewarded with a knighthood.

After such an achievement no one disputed the laying of cables in any and every ocean, and other cables followed one another in natural succession. And surely this chapter is a record of conquest of

the most brilliant kind, since every one of the ocean's forces were raised against the scheme, only to be overcome by man's perseverance. Storms, rocks, whales, and saw-fish all opposed it, but in vain, and the mystery and inevitability of the cable are wonderfully expressed by the following lines of Rudyard Kipling:—

"The wrecks dissolve above us, their dust drops down from afar—
Down to the dark, the utter dark, where blind white sea-snakes are.
There is no sound, no echo of sound, in the deserts of the deep,
On the great, grey level plains of ooze, where the shell-burred cables creep.
Here in the womb of the world—here on the tie-ribs of earth
Words, and the words of men, flicker and flutter and beat."

CHAPTER X

Safety at Sea

I WANT to draw your attention to the rather peculiar fact that in olden days, when ships were small and unhandy, often being quite unseaworthy and never capable of bearing overmuch ill-treatment from the waves, the captain carried one or two small boats, as his inclination decided, and perhaps some primitive life-belt or similar apparatus. The ship was likely enough to founder, but the smallest provision, or even none at all, was made for the safety of those on board. Nowadays, our ships are larger and stronger, their masters are first-class mariners, accidents are comparatively rare, and the most tremendous concern is shown for the proper equipment of the ship with life-saving appliances. Yet it is safe to say that more lives are lost at sea in the present century than were lost two or three centuries ago.

The reason is not far to seek. Yesterday an ocean voyage was a thing to be undertaken by necessity only, and none but adventurers of the hardiest sort went to sea for pleasure. To-day, everybody travels. Then, the sailing ships pursued very leisurely courses, often being blown out of the direct route and finding themselves miles from their destinations. Now speed is the one thing desired, with the result that all

steamers keep to a "lane" of a few miles in width, and collisions, even in mid-ocean, are becoming more and more common.

It must have been a very long time before there was established any recognized system of saving life at sea. As soon as ships grew big enough they carried small boats, but they were for use in going ashore, and in boarding the ships of enemies. The plan of taking to the boats when the ship was in danger of foundering was an afterthought. Possibly the first kind of life-belt was an inflated skin, in imitation of the ancient Assyrians, who are represented as crossing rivers by this means. To this day some maritime tribes make floats of bundles of reeds tied together, while others make a kind of belt of two light pieces of wood lashed to a vine.

But, as prevention has always been better than cure, the old-time seamen thought more of the means by which they could avert calamity than of the means to save themselves after calamity had come to them. So they began to make maps and charts. These early charts were so grossly inaccurate that they were of very little use; but that did not trouble the seamen much. They had a much better plan. They simply refused to sail into seas that were not well known to them. We have seen before how sailors, afraid to venture down the coast of Africa, came home with the most outrageous tales to save their faces, tales of evil spirits and flames of fire. The evil spirits they may have imagined and believed in, but they simply invented the flames. No amount of St. Elmo's fire, or other known electrical phenomena, can explain these fiery stories. Besides, St. Elmo's

is common to northern as to southern latitudes, and every sailor worthy of the name was used to its manifestations. It is not even confined to the sea.

The chart-makers persevered, however, but the results of their labours were never of very much service until reliable instruments came into use for reckoning distance and position. The old-time sailor had only his astrolabe, his lead, and his log. An enormous proportion of shipping disasters is caused by grounding, and it is not unlikely that a considerable percentage of these might have been avoided by a timely use of the lead. At any rate, the lead, properly used, is as good as a leading-string to the expert seaman. Probably it is the oldest of his tools —one that he has been using from the very earliest times—and the lead of the present day is almost exactly the same as the lead of our forefathers, a weight on the end of a few fathoms of twine, with which he sought a way through shallow waters. The log is another ancient instrument. Formerly it was literally a log, of oak or teak, attached to a line and thrown out at the stern of the ship for a certain length of time. The line was knotted at regular intervals, and the speed of the ship was calculated from the number of knots paid out. Thus the day's run was ascertained and entered in a "log-book".

The wreck of the *Medusa*, a French troop-ship, in the early days of the nineteenth century, will give you some idea of the extraordinary differences between the conduct of ocean vessels then and now. The *Medusa* set sail from Rochefort on 17th June, 1816, bound for Senegal, accompanied by three other ships—the *Loire*, a store-ship; the *Argus*, a brig; and the *Echo*, a cor-

vette. The *Medusa* was commanded by Captain Lachaumareys, who, before the vessel had been many days at sea, allowed, in a way inexplicable to us, a certain M. Richefort to take over the entire charge of the navigation. No doubt the reason was that Captain Lachaumareys knew less of navigation than he pretended, and was glad of a chance to shift the responsibility on to someone else's shoulders.

On 1st July the shores of Sahara were sighted, and not long after Cape Blanco came into view. Now, according to the instructions given by the Minister of Marine, and the advice of all the passengers who had sailed that way before, a wide detour should have been made in order to avoid the dangerous Arguin Bank; but to all these suggestions Richefort turned a deaf ear, simply replying blandly: "*Mon cher*, we know our business; attend to yours and be quiet. I have already twice passed the Arguin Bank; I have sailed upon the Red Sea; and you see I am not drowned."

The next day it was noticed by all that the colour of the sea had changed. At about three o'clock they were alarmed to see sand rolling in the water, and the captain, aroused at last, ordered soundings to be taken. Eighteen fathoms of water were found; but at the next sounding, only six. A few minutes later the *Medusa* grounded.

We can imagine the panic that ensued. The sea was very rough, and a strong wind was blowing, thrusting the ship deeper and deeper into the sand. No help could be expected from the desolate coast confronting the unhappy travellers, and the other ships of the expedition had long ago left the *Medusa* to pursue what erratic course her new captain chose.

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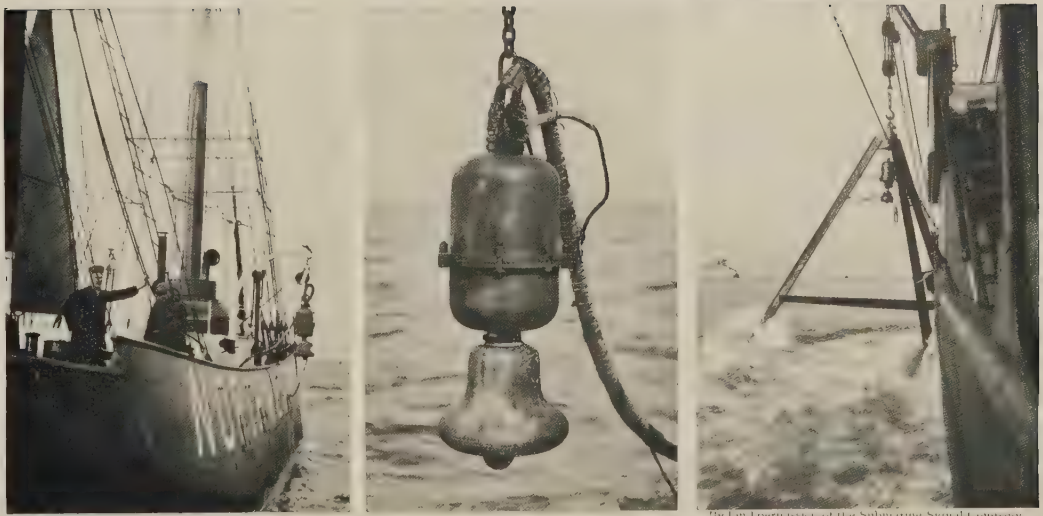
THE DANGERS OF THE SEA

A liner threading her way through a field of ice in the North Atlantic. The above picture will bring to mind the terrible disaster which befell the *Titanic* just before midnight on Sunday, 14th April, 1912, when she struck an iceberg and went down, carrying to death 1635 human beings. After this appalling disaster an International Commission for saving life at sea was formed, and much has been done to minimize the risks of ocean voyages.



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By kind permission of the Submarine Signal Company

A LIGHTSHIP WITH SUBMARINE BELL READY TO BE LOWERED

The dangers of navigation in foggy weather are greatly reduced by the use of signals given forth by submerged bells. The bells are rung by compressed air according to a code, and ships fitted with receiving apparatus can lay their courses in thick weather with far greater safety than is possible with ordinary fog-signals, which are very capricious.

After a good deal of confusion and some violence, it was decided to build a raft, on which the troops of soldiers could be towed ashore; the other passengers, amongst whom were several women, were to go in the boats. The raft was soon constructed, of barrels, boards, masts, and cordage, and by this time the ship was so much lightened that at high tide she was nearly afloat. The passengers then begged the captain to sacrifice the artillery, but this he refused to do, on the ground that it was the king's property.

At low tide the ship settled down again deeper than before, and the wind rising, it was soon seen to be hopeless to dream that the *Medusa* might ever be floated again. Nothing now remained but to take to the boats. The Governor of Senegal, M. Schmalz, with his two daughters, was among the passengers, and at his instigation the soldiers were persuaded to board the raft, which he solemnly swore not to desert. A hundred and fifty souls were soon afloat on this crazy refuge; but so insecure was it that the barrels of provisions that had been placed on it had to be thrown overboard to prevent it from sinking. The only food then left upon the raft was a sack containing about twenty-five pounds of biscuit, which had not been improved by total immersion in the sea.

After a great deal of delay, in which everyone seems to have fought for himself alone, most of the passengers were crowded into the boats, few of them with anything more than the clothes they stood up in. It is horrible to relate that seventeen of them were left upon the *Medusa*, and that no attempt to rescue them was made for fifty-two days, when all but three were dead. Still more horrible is the base treachery with which

the boats deserted the raft with its hundred and fifty soldiers. The fate of these unfortunate creatures is soon told. Of the whole number, only fifteen escaped to tell the tale of their sufferings, when, on 17th July, a passing vessel picked them up. The rest had died of drowning or exposure, or had been murdered in order to lighten the raft.

The people in the boats fared better; but only two of the boats, those in which were Captain Lachaumareys and M. Schmalz, were properly provided with food and water. A heavy sea added to their miseries, but at length they made the land in safety. The rest of their adventures occurred in the desert, and have no place here; but I cannot omit to mention that these wretched people had escaped death by drowning, sunstroke, thirst, and starvation, only to be cast on a dry, barren shore where there was no water and no food, and none but actively hostile inhabitants.

We like to believe that nowadays such a thing could not occur. Certainly no captain would ever voluntarily resign the command of his ship even to his dearest friend, far less to a stranger. Besides, more recent disasters have taught all governments the absolute necessity of having sufficient boat accommodation for all persons on board. Yet we know that calamities do happen, on a larger scale than ever before. The *Empress of Ireland* was fully equipped with boats and every kind of life-saving apparatus; but she went down, sinking like a stone, within ten minutes of her collision, and she listed in such a way that her boats could not be launched. Try as they will, men cannot at present declare themselves conquerors of the sea, for it is so often the

unexpected that happens. We can contend with the accident that comes in the ordinary course of events, the accident that can be foreseen. The one that occurs in the wrong way, revealing the weak spot that no one suspected, baffles us. But we are taught by our mistakes; and now we know so much that we are beginning to realize our ignorance.

With a good chart, on which are marked all rocks, sandbanks, and shoals, anyone having a slight knowledge of navigation and a good compass—and a lead line—can make his way. As you know, the coasts of Great Britain, and, largely by British endeavour, the coasts of all the world, are thoroughly lighted. Every dangerous headland bears its lighthouse, while lightships and lighthouses mark dangerous places in the water. Lighthouses are almost as old as ships; at least, lighthouses were built more than 2000 years ago. You may see the remains of a very ancient one above the castle at Dover—a Roman pharos, or, as the local vulgar call it, Pharaoh's tower. What connection Pharaoh could have had with Dover they do not trouble to inquire. The early forms of lighthouse had grates on their summits, on which wood fires blazed. Later on coal took the place of wood, and coal lights survived in the Baltic as late as 1846.

No two lighthouses are alike. Every separate light calls for different treatment, for not only are the conditions of each one different, but each light must be distinct. That is why some lights flash, some revolve, some are stationary, some are plain, and some are coloured. All these details are noted in the chart, and also the particular kind of noise by which any one may be identified in fog; for nearly every lighthouse

has to be provided with a fog-horn. On a really thick night even the brightest lamp fails to penetrate more than a few hundred yards. Then, any number of noise-making instruments—horns, gongs, sirens, rockets, bells, whistles, trumpets, or guns, worked by hand, steam, electricity, petrol- or gas-engines—are used as fog signals. The bell-buoy, with its melancholy tolling rising and falling on the wind, is familiar to us all.

In addition to these warnings of permanent dangers, the seaman has others to notice. The sky is an open book to the experienced mariner, who can foretell the weather with great accuracy, and thus, to some extent, guard against the dangers of storm. But the men who sail about the coasts are not always weather-wise, and to help them the signals known as storm-cones are displayed whenever necessary.

Meteorology, like all other sciences, has made wonderful strides in recent years, and polar exploration, and probably aviation, will teach us more and more. In view of the services which a knowledge of this science renders to sailors, no one can afford to laugh at weather prophets. Admiral Fitzroy was the first Englishman to pay serious attention to the weather, though in doing so he was following the example of Commodore Maury of the United States Navy. Fitzroy was fortunate enough to be commander of the *Beagle* on her famous voyage with Darwin on board as naturalist. We can imagine the two rapidly becoming friends, the giant brain of Darwin helping Fitzroy to understand natural phenomena, and the wider experiences of Fitzroy illuminating the researches of Darwin. Fitzroy was a sailor; he had had no scientific training. We might never have

reaped the benefit of his observations—indeed, he would probably never have made them—if circumstances had not been unfavourable to him. As it was, he had command of the *Beagle*, and the responsibility for the safety of all the learned men she carried, knowing that she was what is commonly known as a "coffin-ship". She was badly designed and badly built. The likeliest thing for her to do was to founder in the first heavy sea she encountered.

Such being the case, Admiral Fitzroy had more than an ordinary commander's need to keep his weather eye open. It was life or death to him to be prepared for storms, and the two years' anxiety on board the *Beagle* resulted in the extraordinary knowledge of storms that afterwards made him famous, although he is better known by his barometer than by his more important work as Meteorological Statist to the Board of Trade. Our Meteorological Office was formed in 1854, with Fitzroy as Director. In those times no one had dreamed of officially forecasting the weather; in these islands it was a preposterous idea. However, Fitzroy had sufficient confidence in his observations to dare to forecast a storm, in February, 1861.

The reports sent in to the Meteorological Office to-day are on a colossal scale; but Fitzroy started his operations with no heavier foundation than twenty-two morning reports and ten afternoon reports from this country, and five from the Continent. So far as he went he was accurate, and his efforts led men to consider this great problem of the weather as something more than an infinite subject for polite conversation. Some of the weather rhymes composed

by Fitzroy for the guidance of seamen are worth remembering. Though you must have seen them before, it will do you no harm to reread them:—

First rise after low
Foretells a stronger blow.

Long foretold, long last;
Short notice, soon past.

When the wind shifts against the sun,
Trust it not, for back it will run.

When the rain 's before the wind,
Halyards, sheets, and braces mind.
When the wind 's before the rain,
Soon you may make sail again.

While we are on the subject of verse, you may like to learn the rule of the road at sea, if you do not know it already. The main rule is, Keep to the right, that is, starboard; and in daytime there is, or should be, little difficulty. The worst collisions always occur at night or in a fog, and the rules to be observed by steamers at night were put into rhyme by a Mr. Gray, one-time Assistant Secretary to the Board of Trade. The starboard light is green; the port, red.

Two steamers meeting:

When both side-lights you see ahead,
Port your helm and show your red.

Two steamers passing:

Green to green, or red to red,
Perfect safety—go ahead.

Two steamers crossing:

If to your starboard red appear,
It is your duty to keep clear;

To act as judgment says is proper—
To port, or starboard, back or stop her!

But when upon your port is seen
A steamer's starboard light of green,
There 's not so much for you to do,
For green to port keeps clear of you.

At all times:

Both in safety and in doubt
Always keep a good look out.
In danger, with no room to turn,
Ease her! stop her! go astern!

In spite of all the safeguards made binding by law, and in spite of the warnings all sailors receive both by practical experience and by words, written and spoken, it is a melancholy fact that unnecessary accidents happen again and again. Small boats are often very careless about their lights; they light them and let them go out, or perhaps they do not light them at all. Sometimes an ignorant or careless man is set to look out, and nobody knows that he is not doing his duty until the ship is aground or has run down another vessel.

It must be admitted that lights at sea are sometimes very confusing. Lighthouses showing fixed lights may be mistaken for ships, which is one of the reasons why flashing and occulting lights are mostly used. The very bright electric lamps which have recently come into use on lighthouses are sometimes deceptive, as they appear to be much nearer than they really are. Again, on a dark night in a crowded waterway, only an experienced pilot can sort out the different lights and decide to what sources they belong.

Occasionally there are disasters which seem to have no explanation except in gross carelessness or sheer bravado; while on the other hand, for all our arguing and loud-voiced wisdom, there are others in which we can detect no other agency than the hand of God. Such as this was the loss of the *Titanic*.

The *Titanic* disaster had one excellent result, namely, the formation of an International Convention for the Safety of Life at Sea. Great Britain, Germany, France, America, Austria, Belgium, Denmark, Spain, Italy, Norway, the Netherlands, Russia, and Sweden each sent representatives to this Conference, and the fruit of their labours—so far as Great Britain is concerned—matured as the Board of Trade's Merchant Shipping (Convention) Bill. The terms of this Bill are most interesting, and of great importance; and we may spend a few very profitable moments with them. The first part of the Bill is taken up with the navigation of the North Atlantic and the problem of ice and derelicts. In this connection I may quote from the *Sailing Directions* published by the British Hydrographic Office, which, referring to large transatlantic steamers, says: "To these vessels, one of the chief dangers in crossing the Atlantic lies in the probability of encountering masses of ice, both in the form of bergs and of extensive fields of solid, compact ice, released at the breaking up of winter in the Arctic regions, and drifted down by the Labrador current across their direct route. . . . However vast the berg may appear to the observer, he can in reality see only one-eighth of its bulk, the remaining seven-eighths being submerged and subject to the deep-water currents of the ocean. Every-

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THE LIFE-BOAT ON ITS SPLENDID ERRAND

From the painting by E. S. Hodgson.

thing must depend on the vigilance, caution, and skill with which a vessel is navigated when crossing the dangerous ice-bearing regions of the Atlantic Ocean."

The countries subscribing to the Convention have taken a most determined step with regard to ice in the North Atlantic. As it is quite impossible to say where and when dangerous bergs are likely to obstruct the steamer route, they have established an ice patrol. For this purpose two steamers are to be employed the whole year through, keeping watch over bergs floating southwards in the "ice season", and at other times studying ice and its ways, and also notifying the position of derelicts—to destroy which warships will be sent by one or other of the powers.

The United States is expected to manage the ice patrol, a proportionate share of the expense being borne by all the other countries. Another important provision is that any ship's captain meeting with, seeing, or hearing of dangerous ice or any other menacing circumstance near his course, is bound to report the fact both on shore and to other vessels in the neighbourhood as soon as possible. Moreover, he is to proceed with caution, and either reduce his speed or alter his course, under a penalty of a fine of £100.

These ice provisions are a direct result of the bitter experience gained from the *Titanic* disaster. In his report after the inquiry Lord Mersey laid special stress on the fact that "for many years past—indeed, for a quarter of a century or more—the practice of liners when using this track when in the vicinity

of ice at night had been in clear weather to keep the course, to maintain the speed, and to trust to a sharp look-out to enable them to avoid the danger. This practice, it was said, had been justified by experience, no casualties having resulted from it. I accept the evidence as to the practice and as to the immunity from casualties which is said to have accompanied it. But the event has proved the practice to be bad."

Another very useful outcome of the Conference has been the standardizing of distress and other signals. At the inquiry into the loss of the *Empress of Ireland* it was suggested that the officers of the *Storstad* may not have understood the signals made by Captain Kendal. If the decisions of the Conference had been made public a little earlier, possibly that terrible tragedy would never have taken place. A wireless telegraphy installation has been made obligatory on every ship carrying fifty or more persons, except (1) ships that do not go more than 150 miles from the coast, (2) ships whose numbers are temporarily increased for a part of the voyage, provided they do not sail from one continent to another and remain within the limits of latitude 30° north and 30° south, and (3) sailing vessels of such build that the erection of the apparatus is impossible.

Many authorities consider it a pity that the Conference did not also make searchlight apparatus an essential part of the equipment of every large ship. The *Titanic* court of inquiry decided that searchlights may at times be of service, and the occasion of the *Empress of Ireland* disaster was surely such a time. The objection to searchlights on the high

seas is, however, well founded. These great lights are so bright as to be quite dazzling at a range of two or three thousand yards. One is rendered temporarily blind by their radiance, and, even though they might save big vessels from collision, it would probably be at the cost of smaller craft.

We cannot shut our eyes to the fact that the *Titanic* disaster showed some grave deficiencies in the laws governing the equipment of liners. The *Titanic* carried boats for eleven hundred persons, although she had over two thousand on board. According to law she need only have provided herself with boats to hold one thousand. But the boats she had were rendered ineffective from the very undisciplined way in which they were lowered and launched. No boat drill had been held on the *Titanic* at any time; consequently no member of the crew knew what to do nor where to go, and instead of each boat being lowered and manned by the proper men, all going to their appointed stations as though by clockwork, there was a scene of the greatest confusion. Our new Bill does its best to prevent the occurrence of such a state of unpreparedness. Each boat or raft is to be at the disposal of a certain number of certificated lifeboatmen. "An officer, petty-officer, or seaman shall be placed in charge of each boat or pontoon raft, he shall have a list of its crew, and shall see that the men placed under his orders are acquainted with their several duties and stations. . . . Musters of the crew at their boats and fire-drills respectively shall be held at least once a fortnight, either in port or at sea. An entry shall be made in the official log-book of these drills or of the reasons why they could not be held."

Part 4 of the Bill provides for the awarding of "Safety Certificates" to ships which comply with all its regulations. The authorities have really done their utmost to ensure the safety of life at sea, but, after all, it is still the seamen who are responsible for the safety of those with whom they sail. As Mr. Gray, whose verses I quoted a little while ago, is reported to have said, you cannot make people careful by Act of Parliament. You may threaten them with pains and penalties, but you cannot force them to keep their heads and do the right thing at the right minute. A moment's inattention, a moment's forgetfulness, and the danger is incurred. Then steps must be taken immediately to minimize it, but here again warnings are of no avail.

We can never, so long as mankind is human, be perfectly safe at sea. When we have reached the super-human, and no longer make mistakes, when Divine Providence has no longer any reason to chasten us, then perhaps will come the era of safety at sea, but not before. We are struggling towards this halcyon time as the plant in deep shade struggles towards the faint ray of light far beyond it, and in many respects we stand higher than we did a century ago. But much remains to be done before we raise ourselves to summit level.

As one reads the story of wireless telegraphy, the thing that seems most remarkable about it is the extraordinary speed with which it has passed from a curious and interesting, but not very feasible, experimental stage to a great commercial and world-wide power. At a low estimate 7000 or 8000 people—probably a great many more—have had their lives

snatched from imminent peril on the sea, thanks to a timely wireless call for help. At the close of 1899 Signor Marconi was jubilant at being able to send a wireless message from the liner *St. Paul*, on which he was a passenger, to his experimental station at Alum Bay in the Isle of Wight, over sixty miles of water. People then thought Marconi over-sanguine when he assured them that he would presently be able to speak across the Atlantic, a promise he was able to fulfil three or four years later.

The wireless equipment of a ship is not impressive to look upon. The operator's room contains a great deal of apparatus, it is true, but it is quite unimposing. The ship's dynamos generate the current that, after its nature has been changed and made serviceable for its purpose, will surge forth from the aerials on its 186,000-miles-a-second journey over the seas. The operator taps his Morse key, and the impulse has liberated a train of waves that has crossed the Atlantic in about an eightieth of a second. The operator can see the actual spark causing the signal to speed out, but he is not conscious of its existence any sooner than the man who receives it, 2400 miles away.

When he is receiving messages the Marconi operator wears a telephone receiver exactly similar to that used by the girls in telephone exchanges. The aerials high up between the masts—the same aerials are used on ships for sending and receiving—collect, or more properly intercept, the electric vibrations and convey them to an instrument that enables them to energize the electro-magnets in the telephone receivers and so make their presence felt on the

human ear. All the operator can hear is a series of faint clicking noises; but he has been trained to read from these noises, which would be unintelligible—possibly inaudible—to you or me, the dots and dashes of the Morse code.

Wireless has added enormously to the comforts of ocean travel, for it enables the voyager to keep in touch with home during the whole time he is on board ship. The great transatlantic steamers have their daily newspapers, and messages are passing continually between ship and ship for retransmission to the shore stations in different parts of Europe and America. The operator has beside him "sailing charts" which tell him what ships are within his range at any time of the day or night. If he needs help, he knows exactly where to send for it; or, to be more exact, he knows what ship will be first to pick up his distress message, and be first to his aid.

Of course the most important function of wireless is, not to send succour to a ship when disaster has overtaken her, but to warn her of approaching danger, so that she may avoid disaster. For instance, warning is now given by wireless of the approach of the terrible typhoon of the China Sea and the hurricanes of the West Indies. The probable direction of approach of these cyclones can be forecasted with fair accuracy, thanks to the researches of our despised friend the weather prophet, and ships, warned in time, can steer clear of the danger. Warning can also be given, in foggy weather or during snowstorms, of the proximity of dangerous coasts and headlands. Lightships, or land stations equipped with a small wireless installation send the warnings,

and a "wireless compass" gives the mariner the exact direction from which it is sent. Weather reports and warnings of one kind and another are now flung across the world continually by day and night; and by sending them time signals every day, wireless gives great assistance to ships at sea. At a prearranged moment every day the Eiffel Tower and other powerful land stations transmit Greenwich mean time, thus enabling ships to set their chronometers with absolute accuracy. So long as he knows Greenwich mean time a ship master can exactly fix his position on the chart.

Curiously enough, it is said that wireless telegraphy has proved itself a boon to the submarine cable companies. On the face of it, it seems rather ridiculous that this should be so. But you must remember that cables are continually in need of repairs, and for this purpose the companies have to maintain repair ships in constant commission. All these ships are now fitted with wireless, and instead of having to return to port after carrying out a repair in some distant part of the earth, wireless instructions are sent to them, and they can proceed direct to the spot where they are next required, often saving needless voyages of hundreds of miles.

Doubtless you have heard of the submarine bell, a safety device with which all big ships are fitted. It is an extremely useful appliance, which enables sound signals to be heard in foggy weather at far greater distances, and with far more certainty than is possible with ordinary sound-producing instruments, such as fog-horns and sirens.

Sound travels in air at the rate of 1100 feet a second,

but in water its rate of travel is more than four times as fast. In water there is nothing to impede the sound waves, but you know well enough that in air they are liable to all sorts of interruption. Moreover, sound is extraordinarily capricious in foggy weather. You may hear a fog-signal quite loudly one minute and not at all the next. At one time I used to haunt the Thames estuary and approaches in a small sailing boat, and I remember that nothing dismayed me quite so much as the fog-horns and fog-bells. Fog is bad enough in any circumstances, but in a small boat in a crowded lane with a purling tide it is hideous. The fog-signals so far from helping me, added untold terrors to the fog. I could never distinguish one signal from another, and I could never tell with any confidence from what direction any particular sound came. I used to put the fault to my own account, and mightily blamed myself for what I thought—and my friends had no compunction in telling me—was my crass stupidity. The other day I came across a certain Board of Trade Warning to Mariners that has restored to me some of the self-respect I lost in the fogs of old. It seems to tell me that I may lay to the sound waves the fault for which I was wont to blame my overwrought ear-drums and my want of discernment.

Here is the Warning, which is surely remarkable enough to be given here. May it interest you, reader unknown; may it be seen, too, by certain reproachful passengers of the *Fram* (of five tons, and the crankest, most unhandy cutter that ever came to grief), and may they exonerate her skipper!—

"The mariner shall not assume (1) that he is out

of ordinary hearing distance because he fails to hear the sound (the fog-signal); (2) that because he hears a fog-signal faintly that he is a great distance from it; (3) that he is near it because he hears the sound plainly; (4) that the distance from and the intensity of the sound on any one occasion, is a guide to him for any future occasion; (5) that the fog-signal has ceased sounding because he does not hear it even when in close proximity."

And this also:

"Caution.—As the cautionary notices respecting fog-signals . . . do not appear to be quite understood, more especially the paragraphs pointing out that such signals are heard at greatly varying distances, and that there are occasionally areas round a fog-signal station in which the fog-signal is wholly inaudible, it is thought desirable to point out to seamen that not infrequently a fog-signal, which may be heard under favourable circumstances from a distance of 10 miles or upwards, is inaudible when only two or three miles off it, and that no surprise should be felt if, from a vessel either at anchor or under way not far from a fog-signal station, the sound of the fog-signal is not heard on board."

The way of the submarine bell is this: A bell, worked by compressed air, or, in some cases, electricity, is suspended under water in a position of danger—on a sandbank, or a rocky ledge, for instance. Generally it forms part of the equipment of lighthouses and lightships; sometimes it is attached to a buoy, in which case it is automatic, being rung by the motion of the sea. However calm the water may seem, it is never without movement enough to

ring the bell. The bell is rung according to a definite code of signals, which is given in the "sailing directions" that all ships carry. In fact, the bell rings just as the light in the lighthouse flashes, and the mariner can at once distinguish the signals by their regular sequence and duration. In order to pick up the signals the ships are fitted with suitable receivers. These consist of microphones—delicate little instruments for magnifying sound—which are fixed in little tanks of water fitted below the water-line to the inside of the skin of the ship, one on each side, a little abaft the stem. The microphones are connected with telephone receivers on the bridge, or in the chart-house, and thus the navigating officers are able to hear the signals given forth by the bell, and can check or alter their course by its aid.

The submarine signalling between ship and shore, or ship and light vessel or buoy, soon proved to be of such great value to mariners that the Submarine Signal Company (by whom it was developed, and in whose care it still remains) set to work to devise apparatus to enable submarine bell communication to be had between *ship and ship*. You may remember the circumstances of the collision between the *Republic* and the *Florida*. The *Republic* was vitally hurt, and sent out wireless appeals for help. The White Star liner *Baltic* had picked up the submarine bell at Nantucket Shoal Lightship, had laid her course from that point to New York, and had proceeded 80 miles on her way, when she was stopped by the distress call from the *Republic*. She also had the following message from the stricken ship, giving her bearings, as follows: "Have picked up Nan-

tucket by submarine bell north-north-east, sounding 35 fathoms".

So the *Baltic* turned round, headed again for the submarine bell on the Nantucket Shoal Lightship, got within range of it, and then began her search for the *Republic*. It was like one of those "hot" and "cold" hunting games that children play. When the captain of the *Baltic* could not hear the submarine bell on Nantucket Shoal he knew that he was "cold"; so long as he heard it he was "hot"—he knew that he could not be very far from the *Republic*. He said afterwards: "After twelve hours' search, zigzagging and circling in the fog, changing our course as each new bit of information came by wireless, we at last found the *Republic*. We came within a hundred feet of the ship before we could see anything, and then we saw only the faint glare of a green light they were burning—like the illumination you burn on the Fourth of July. . . . During our twelve hours' search I estimate we travelled 200 miles in one zigzag course before we found her, and all within a sea area of 10 square miles."

Of course, the moral of this story is clear, for if the *Republic* had been fitted with a submarine bell her rescuer could have got in touch with her many hours earlier. Her bell would have drawn the *Baltic* to her unerringly. The receiving instruments on that ship would have kept the sound dead ahead, and as easy to follow as the *Republic* herself would have been, had she been actually visible instead of shrouded in dense fog. In the last few years many ships have been provided with submarine bells for use in a similar emergency. They are also used

largely on ships' boats, which are thus enabled to keep in touch with one another, after a disaster has happened, and to guide a rescuing ship to their whereabouts.

A very ingenious system for enabling a ship to find her position in a fog is that known as the Kelway. The depression of a key at a signal station simultaneously sends out a wireless signal and fires an explosive signal. A Hertzian wave receiver is provided on the ship, and as soon as the wireless signal is received a stop-watch is started, to be stopped again as soon as the sound of the explosive signal is heard. The speed of travel of sound being known, the dial of the watch can be graduated to give immediately the distance of the ship from the signal station. The ship proceeds on her course until she again receives the wireless signal and the sound signal, when she again ascertains her distance from the signal station. In this way she learns the length of two sides of a triangle, the base of which is constituted by the distance she has run between the two observations. These elements may be plotted on the chart in the ordinary way, or an instrument, devised by Mr. Kelway, and known as a telemeter, may be employed to solve the trigonometrical problem mechanically, and to give a miniature of the scene of operations, with the distances and bearings at the time of the observations. By the use of his method the inventor claims that in narrow waters, such as those of the St. Lawrence or the Strait of Dover, inward and outward bound craft would be enabled, even in fog, to follow their respective safe "lanes" with a reduction in the chances of collision.

So far we have dealt chiefly with the means of ensuring safety at sea, by avoiding, as far as possible, the risk of accident. But we know that accidents will happen, in spite of all our precautions, and we must, therefore, turn our attention for a minute or two to the devices in use for preventing loss of life after an accident has happened. First and foremost, I think, we must place water-tight bulkheads. There are unsinkable boats; but the unsinkable ship of large tonnage has yet to be built. It is easy to say that a ship must be unsinkable, if she is divided up into a sufficient number of air-tight compartments of sufficient area to maintain her buoyancy in the event of a large part of her being torn away. She might be if the doors in the bulkheads could be closed instantaneously at, or before, the moment of collision; and if the bulkheads themselves could be certain of resisting the pressure of the inrushing water without collapsing. The trouble is that the doors are rarely closed in time, and are rarely water-tight. Of course, hundreds of fine ships have been saved by their bulkheads, sometimes after very grievous injury. But when a ship's bottom is torn out, as was the *Titanic's*, no human device can keep her afloat.

The bulkhead doors of many big ships are now fitted with very ingenious closing apparatus. Each door has a hydraulic ram, which is electrically controlled from the chart-house and other central stations. By pressing a button the doors can be closed, separately or all together throughout the ship, in a second or so. Of course the doors must be water-tight; one trusts that they are. India-rubber jambs are provided for them to bear on; but I confess

to have seen packing that certainly did not seem to be in the freshest and most wholesome state of efficiency.

After the bulkheads come the boats. There are plenty of these now, on all ocean-going passenger boats, to accommodate every soul on board. Tardily provided, it is true, but still they are there. But boats are no good unless in the water, and right way up; and here is the difficulty. For ships' boats are not easy things to launch in a panic, or in a gale of wind. How often have you read, authentically, of a boat just launched, smashed to atoms against the ship's side before the davit-falls could be released and the crew could pull away? How often have you read of a ship sinking with a bad list—with decks almost perpendicular, perhaps—and the boats on one side of her impossible to be lowered? Not seldom, I think. Of course all boats are fitted with automatic releasing gear, provided to ensure that the boat shall be freed from the falls at the right moment—when it touches the water and weight is off the falls. But somehow, reading the newspaper carefully, there seems so often to be a hitch—somewhere. Let us hope that with compulsory boat drills there will be hitches nowhere.

Ships are provided with rafts, in addition to boats. They are made, as a rule, with two decks, with water-tight spaces in between them and lockers for the storage of food and drink. They are launched by the releasing of a catch, and simply slide overboard, or float off, if the vessel sinks. It is immaterial which side floats uppermost. The disadvantage of a raft is that you must be in the water before you can get on to it, for it is not loaded, like a boat, before launching.

It is provided with life-lines and floats, but even with these aids to the drowning it is not altogether easy to get on board it. However, the raft has undoubtedly proved its utility time and time again.

It seems unreasonable, but fire at sea is a very common and terrible source of danger. It is by no means infrequent for a ship to sail thousands of miles with her cargo smouldering, ready to break out into flames as soon as the opportunity arises. The crew take the utmost care to prevent the entrance of air to the hold, to fan the smouldering mass into a blaze. But spontaneous combustion will take place at any time in an inflammable cargo, such as coal, cotton, rags, certain kinds of chemicals, and many other commodities.

A ship on fire is the most dreadful of the sea's terrors; and yet the sea has so many terrors that I am not sure of my right to that statement. But I think fire at sea, and starvation at sea, are the calamities most to be dreaded, and indeed, actually dreaded, by sailors. A few years ago there was driven ashore on the coast of Tralee, during an awful gale, a fine four-masted sailing ship—the *Port-Glasgow*. The *Port-Glasgow* had bad weather all the way from Portland, Oregon — real Atlantic winter weather, gale after gale, buffeting after buffeting — so that she took a hundred and fifty days on the voyage. And five weeks before she drove ashore on the cruel coast of Tralee, the food gave out. For five weeks the crew had no other food than wheat, which they ground in a small coffee-mill.

CHAPTER XI

The Story of the Life-boat

For every ship that is lost on the high seas a great number come to grief on shore, or within easy reach of shore. I have said already that ships to the estimated value of £9,000,000 are lost around our coasts every year. The provision of means for sending immediate and unfailing aid to ships in distress should certainly come into our story of the conquests of the sea. Is there anything in the world nobler, more humanizing than the service of the life-boat? Where in everyday life are there to be found greater heroes than in the heroic ranks of the life-boat crews?

The life-boat itself was the outcome of a grievous tragedy that might have been prevented had the means been to hand. In 1789 there was a terrible storm on the north-east coast of England, in the course of which the *Adventure* of Newcastle was driven on to the Herd Sands, which lie at the mouth of the river Tyne. Although these sands are quite close to the shore, and thousands of people assembled to watch the wreck, from first to last there was no hope of rescuing a single soul on board the *Adventure*. No boat could have been launched in the cruel surf, and there was no possible way of aiding the wretched seamen. All England was aroused by the terrible story of the

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Photos. Bert Hole, Watchet

TESTING A SELF-RIGHTING LIFE-BOAT

After the life-boat has been received from the builders, and before she is sent to her coast station, she is put through a series of most elaborate and stringent tests. Since the Southport accident in 1886, when the two boats failed to right and caused thirteen men to be drowned (only three were saved), these tests have been made much more severe. The photographs show the capsizing trials. Since 1883 the tests have been carried out with all the life-boat's gear aboard except the sails.

drowning of a ship's crew within sight of land, and the people of South Shields offered a valuable prize for a boat which could be sent to sea in a storm.

Now, before this time a boat had actually been designed by Lionel Lukin, a coach-builder of London, for the very purpose for which the humane folk of South Shields offered their prize. The idea of Lukin's boat was sound, but the boat was not strong enough to stand the pounding of a rough sea. Still, it was the only boat of its kind that had ever been patented, and it formed the basis of design for most of the competitors for the South Shields prize. The honour of producing the best design fell to Henry Greathead, a boat-builder of Richmond, Yorkshire. Greathead's boat was 30 feet long and 10 feet in beam, and was lined and covered with cork. It could carry twenty people, ten of whom were oarsmen, while two were needed for steering. The boat was bought by the Duke of Northumberland and presented to North Shields, from which port it made many journeys and saved many lives. Another competitor was William Wouldhave, the beadle of a church at South Shields. His design had certain distinct features, and, although he did not win the prize, some of his ideas were embodied in Greathead's second boat. Wouldhave's name has rightly been given a place on the memorial to Greathead and his life-boat which has been erected at South Shields.

The modern life-boat is, of course, a great improvement on Greathead's, but it is curious to notice that for sixty years after the disaster at the mouth of the Tyne which inspired Greathead's efforts, little was done to increase the possibilities of life-saving at sea.

The Royal National Institution for the Preservation of Life from Shipwreck, now known by the simpler but less imposing title of the Royal National Life-boat Institution, was formed in 1824, at the instigation of Sir William Hillary. The Society did excellent work for some years, looking after life-boats and their crews all along the coasts; but interest soon waned, and the Society languished for want of support. Then a second terrible shipwreck occurred in almost exactly the same place as the first. South Shields sent its Greathead life-boat to the rescue with twenty-four men on board, but alas! it overturned and was washed ashore. Only four members of its gallant crew managed to save themselves, the other twenty being caught under the boat and drowned. Clearly the Greathead boat left something to be desired; and in 1850 the Duke of Northumberland offered a prize of a hundred guineas for the best model life-boat. Success fell to James Beeching of Yarmouth, who produced the first *self-righting* boat ever built. But even this was not the infallible craft required. The life-boat committee then put the matter into the hands of James Peake, assistant master-shipwright at Woolwich dockyard, with instructions to choose the best features of every life-boat design which had been sent in and embody them all in one model. Peake did as he was told, and by dint of patching and matching, improving here and taking away there, our present efficient life-boat has been evolved.

I expect you will have noticed that three men whose names are closely connected with the invention of the lifeboat, Greathead, Wouldhave, and Beeching, were all men of the east coast. Moreover, the most famous

life-boat crews of Britain—one may almost say of the world—are those of Yorkshire, Lincoln, Suffolk, and Kent. The Deal life-boat in particular has won honour and glory for itself by the way in which it puts to sea in any weather to rescue vessels from the eager Goodwins.

Some time ago the survivor of a vessel wrecked in the Channel was asked the question: "How did you know that it was the English coast you could see?" "Because we saw a life-boat putting out to meet us," was the significant answer. Listen to this extract from a newspaper of 25th November, 1893. Ancient history, perhaps, but history that has repeated itself over and over again:—

"At Dungeness on Sunday morning the Littlestone life-boat put out to sea in answer to signals of distress from the barque *Johanne Marie*, of Christiania. The boat could not get near the vessel, owing to the force of wind and waves, and was drifted by the heavy seas past her on to the shore. The *Buffalo* life-boat was then manned by volunteers, drawn over the shingle to the east of the wreck and launched. She reached the *Johanne Marie* and was capsized; the men were washed ashore and two of them drowned. Notwithstanding this, fresh volunteers from the crowd were found to man the *Buffalo* a second time and she put to sea again, but again in vain. A fourth attempt was made to save the eleven Norwegian sailors, who had now been twelve hours in the rigging, by the Dover life-boat, and this time they were rescued."

What, then, is this life-boat of which we have been talking? What are its essential uses and its especial properties? Well, obviously we cannot hope to under-

stand the need for such boats without trying to understand something of the ways of the sea. To begin with, you know that a wave, however big and mighty it is, is not necessarily a dangerous thing. If we are out in a small boat we can ride on the largest waves in perfect safety. We look at the wall of green water apparently advancing towards us, and we think that it will certainly swamp us; but nothing of the kind takes place. On the contrary, we find ourselves lifted up and borne gently along over the wave and down again into the trough behind it. We can ride, I say, on the biggest waves in perfect safety, *provided they be not broken*. You know, too, that waves do not really move along. The motion is caused by some influence underneath the water. The surface rises and falls, and boats on the surface—and for some distance beneath it, as the crews of submarines will tell you—rise and fall too, quite undismayed by the height of the waves. But if the wave should rise too steeply for its base to support its height, or should a cross influence produce another set of waves running in opposite direction to the first set, or should the water be shallow, we get the condition known as broken water. Green waves are as harmless as boiled milk, but white waves spell trouble.

The life-boat, you see, is pre-eminently a surf boat, which can live in the boiling, seething fury that occurs when a wind-driven wave hurls itself upon the shore to meet and battle with cross currents, backwashes, the pull of the tide, and the weight of its own crest. That is the kind of sea which fills and batters to pieces any ordinary boat built for riding on the smooth rollers. Of course, unless you happen to live

on an exposed coast, you cannot know what really rough sea is like; probably you will not know in any case, for you are snugly abed on winter nights when the worst storms rage. A really big wave, of the kind that sometimes burst upon our Atlantic coast-line, will exert a force of 3 tons to the square foot on whatever it happens to fall. At Bournemouth, during an historic storm some years ago, the waves raced in at a speed of 67 miles an hour, and speeds of 75 miles an hour have been recorded. Perhaps you have heard of what the waves once did at Wick; how they tore from the breakwater a mass of masonry weighing about 1350 tons, and tossed it some distance away.

The end for which Lukin and his successors worked was to produce, not only an "unimmergible" boat, but a boat that, by its strength of construction, could defy the attacks of the heaviest wave, by its buoyancy keep afloat, and be capable of retaining its natural position, keel down and thwarts uppermost. This self-righting capacity is, after all, the essential feature of a life-boat. Wouldhave's boat possessed the elements of it, as did the boats of the vikings. A story is told showing how Wouldhave learnt the natural law upon which his boat was based. He was out one day for a walk in the country, when a woman who was drawing water from a well called to him to come and help her. At the top of her bucket the half of a wooden bowl floated, and as Wouldhave talked to her he kept fidgeting with this. Over and over he turned it, but every time it reverted to its original position. Try as he would, he could not make it float bottom upwards. He soon realized that he had found what he had long been looking for—the design for a

self-righting boat. In scientific language the shape of the life-boat is the quarter of a hollow prolate spheroid. In unscientific language, it is a long, wide, round-bottomed shape, built very high at the ends. This shape embodies all the essentials of a surf-boat, since it exposes sturdy bows to the waves, and refuses to float in any other position than right way up.

The predecessor of the Life-boat Institution was the pilot cutter, which often effected rescues of drowning men. And the revenue officers too would, wherever possible, render assistance. But superstition and greed alike were against the rescue of shipwrecked persons, and until such deep-rooted prejudices had been eradicated, it was of little avail to think of maintaining any organized service. By the third decade of the last century, however, the morals of our forefathers had so far improved that wrecking as a regular business only survived on the southern and western coasts of Great Britain. Dr. Sharp, Archdeacon of Northumberland, receives the honour of having initiated, and to a large extent maintained, the first life-boat service in Britain. He instructed Lionel Lukin to apply his ideas to a Yorkshire coble, a boat already famous for its seaworthy qualities, and the completed "life-boat" was stationed at Bamborough Castle. The archdeacon also arranged for a watch to be kept from the castle tower, from which signals could be made to Holy Island, and for two horsemen to patrol the shore in bad weather. In fog a bell was to be rung and a gun fired. The Holy Island fishermen could often venture out to the relief of a distressed vessel when no boat could leave Bamborough.

The reorganization of what is now the Royal

National Life-boat Institution came about in 1850; but it soon became evident that, in spite of all the improvements and modifications introduced at one time and another, the infallible boat had still to be built. In the year 1886 three of the so-called self-righting boats were capsized, in each case with loss of life. As a result of those catastrophes, the managing committee of the Institution commissioned Mr. G. L. Watson, famous as a designer of yachts, to try his hand at a life-boat, and in 1890 he produced a non-righting boat which did splendid work and achieved great success. Then followed years of discussion as to the rival merits of self-righting and non-self-righting boats. The self-righters were nicknamed "roly-polies" and "make-believes", but they did not lose the popular favour. On the contrary, they continued on their way so well that their character was ultimately vindicated. A Committee appointed by the House of Commons in 1897, to inquire into charges which malicious persons had made against the Life-boat Institution, included the following clause in its report:—

"In the opinion of your Committee, the boats are generally adapted for the work they have to perform. Your Committee do not feel that they can recommend one type of boat for adoption rather than another. Nor do they hold it can be decided as a matter of certainty that, in varying circumstances, either a self-righting or a non-self-righting boat is absolutely the best. Both types are most carefully designed, built, and furnished. Persons fully competent to judge declare some for one, some for the other pattern. The practice of the Institution is to consult the men on the spot—who will have to man the boat—and to allow

them in great measure to decide for themselves in which kind of boat they will do this difficult and inevitably dangerous work. Confidence of the crew in their boat is in itself an element of security, and your Committee do not advise any change in this system."

The non-self-righting boat has, since 1897, very much increased in favour, and now the boats of this kind hold the lead in point of numbers. But in 1886 another question was brought before the minds of those interested in the life-boat, namely, the use of steam as a motive power. There were two great objections to the introduction of steam life-boats. The first was, that life-boats are generally launched in high seas which would put out the fires; and the second, that life-boats are manned by fishermen and boatmen, who, while excellent men for working sailing or pulling boats, would be useless when confronted by a steam-engine. Steam-tugs were already provided for towing life-boats at certain places, and it was considered that few places on the coast were suitable for the establishment of steam life-boats. The great point about the steam life-boat is, of course, that it can make its way directly to a wreck; but this has not proved a sufficiently important matter to outweigh the other disadvantages. The first steam life-boats were propelled on the hydraulic-jet principle, because it was thought that a screw propeller would be more often out of the water than in. Later boats had the screw protected by a tunnel, but this, though it obviated racing, detracted very seriously from the speed of the boats. The steam life-boats did some good work, but there were never more than four or five of them in use in Britain. The motor life-boat,

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SAVING LIFE BY THE BREECHES-BUOY

When the lifeboat cannot go to the aid of shipwrecked persons, a rocket, fired from the shore into the ship's rigging, carries a light line by means of which the crew can haul on board an endless rope. To this rope, in turn, is attached a strong hawser. On this, when it is made fast, runs the breeches-buoy, by means of which the crew are hauled to the shore, one at a time.

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in which the engine is used simply as an auxiliary and does not interfere with the use of sails and oars, has manifest advantages over a steam boat.

Some of the most sinful passages of man's history have been enacted on rocky shores where villains, in the hope of gain, lured their fellow-men to death. So civilized and sensitive have we become nowadays that we shrink aghast from such proceedings, for, though we allow our brethren to die from want every day, we consider deliberate robbery and murder beneath us. In those districts of the British Isles where wrecks were most common—they were not always assisted—the natives followed the teaching of the early Greeks and Romans, who put to death or sold into slavery all who were wrecked upon their shores. We did not kill survivors, at least not often; but we never helped them to reach land, and if they died under our eyes, so much the better. An old Cornish couplet runs—

> Save a stranger from the sea,
> And he 'll turn your enemy.

Certainly it was held unlucky to interfere with the designs of Nature in respect of wrecked seamen, possibly since the more who survived the less profit would there be to the landsmen. From very early times laws were framed to attempt to reduce this dreadful traffic, but these laws being rarely enforced at all, or at best with great slackness, no very great improvement resulted from them. They did, however, succeed in defining the nature of wreckage. Thus, *flotsam* is goods found floating on the water, between high- and low-water marks, after the vessel

has gone to pieces; *jetsam* is goods thrown out voluntarily for the purpose of lightening the ship; *ligan* is heavy stuff thrown out and attached to a buoy, by means of which it could be found again by the owner; while *simple wreck* is anything thrown up on the shore. By modern law, all these varieties of wreckage belong to the Crown unless they are claimed within a year and a day, and have no distinguishing mark to show whose property they were originally. But numerous cases arise out of the law of wrecks, for the legal definition of wreck is goods that have been left upon the land by the sea, and this naturally admits of a certain width of interpretation. One famous suit was *Rex* v. *Forty-nine Casks of Brandy*, which ended in half the casks being handed over to the Lord of the Manor and half to the King, the difficulty being that some were found floating more than two miles from shore, and some less than that distance, some were lying on dry foreshore and some on wet foreshore, while others were moved up and down by the tide.

"When the Farne Islanders", says an old writer, "see a ship in danger they set down on their knees and do pray very devoutly: 'Lord, send her to us.' . . . But if the ship come well to port they get up in anger and cry: 'The devil take her, she is away from us!'" All along the north and west coasts of England, Wales, and Scotland we find traces of these ghoul-like men and women. Beacon Hill, above Saundersfoot Bay, is one of the many points which retain their names from "the good old days".

In 1619, the people living on and around the Lizard Head petitioned against a proposed lighthouse on

the grounds that "they would have no more benefit from shipwrecks". They did indeed reap benefit, since their houses were all built from the remains of wrecked ships, and they had quite recently made a haul of £3000. It is difficult to believe that at this very day the instinct to wreck and plunder is not wholly eradicated from the Cornish nature. It is said that agricultural people are always harsh and inhuman towards shipwrecked persons—a statement you must weigh for yourself. Most of the Cornishmen were farmers or workers in the tin-mines, and they regarded wreck of all kinds as their lawful perquisite. Within the last hundred years only were they persuaded of the iniquity of hanging out decoy lights, even though they were in many other ways, before that time, estimable people—regular at chapel, and of a serious turn of mind. We must not forget, however, that so late as 1850 Cornwall was still a half-wild county, whose people spoke a strange tongue, and considered England as a foreign land lying beyond the Tamar. Intercommunication was conducted on foot or on horseback, over bridle-paths that had been in use since the days when the Phœnician vessels lay off-shore with their fascinating wares to exchange for tin.

Prussia Cove, once the centre of the Cornish smuggling trade, was the home of the celebrated John Carter, "King of Prussia", who, aided and abetted by his eight brothers, carried on a successful business with Cherbourg and St. Malo. The glory of the smugglers has, fortunately, departed, the last of them ending his days as factotum to the Rev. R. S. Hawker, vicar of Morwenstow, whose *Remembrances of a Cornish Vicar* is full of stories showing the prevalence

of wrecking in the middle of the nineteenth century. His congregation used openly to wish for wrecks, the children's daily prayers including the phrase, "God bless father an' mither, an' zend a ship to shore vore mornin'". A parish clerk, a pious and worthy old soul, once remarked, "I don't see, sir, why there's no prayers for foul weather as well as for fine; the foul weather makes us much the richer." The natives of Morwenstow showed no compunction in thrusting half-drowned sailors back into the water, though, indeed, the elements helped them bravely in this matter.

Great as are the services of the life-boat, it is not to be supposed that the lee shore will ever cease to claim its toll of victims. Serious wrecks on shore are fortunately becoming rarer and rarer. Thanks mainly to better lighting, charting, and buoying of our coasts, and to the knowledge gained by bitter experience, the life-boats rarely have to go to the aid of really big ships. But at best, life-boats cannot be stationed everywhere, but only at those danger-points where their presence is known to be desirable. There have been many historic disasters on shore, so many that it is difficult to know which to choose. But you may be interested to hear the stories of two or three of them. There was the loss of the *Royal Charter*—a case in which no life-boat was available, though it would have been useless in any case.

The *Royal Charter* was a very fine iron-built ship fitted with an auxiliary screw. She was homeward-bound from Australia, with 388 passengers and a crew of 112, and was expected to arrive in the Mersey on 25th October, 1859. She had, indeed, called at Queenstown, and had left again, and there was every

reason to suppose that she would be in Liverpool within the following twenty-four hours. But those who awaited the arrival of the good ship waited in vain. During the night a terrible storm blew in the Irish Channel, and the *Royal Charter*, in spite of her engines, was driven ashore off the coast of Anglesea. When it was seen that the ship was in real peril, rockets were sent up and other distress signals were made in the hope of attracting some attention, but, alas! there was no attention to attract. Shortly afterwards the anchors were let go, and the engines struggled to keep the ship to windward; but within an hour or two the cables parted, and the *Royal Charter* drove broadside on to the rocks of Moelfra Bay, in Anglesea.

A terrific sea was raging, and the only hope of saving the passengers was by means of a life-line which a plucky sailor succeeded in taking ashore. A few persons were actually saved in a bosun's chair by means of this line, but very few, for shortly afterwards a giant wave broke the *Royal Charter's* back. She just came apart "like the falling to pieces of a bandbox". Most of the passengers were crushed to death by the rending ironwork; a minority met their death by drowning; a few, a very few, were washed safely to shore, and were succoured by the Anglesea peasants. Four hundred and fifty-nine persons were drowned, or dashed to pieces on the rocks, or crushed by the crumpling of the ship, in an incredibly short time. Not a woman or child was saved, though there were many on board, and not a single officer survived. Hundreds of mutilated corpses were buried in the little burial-ground of the neighbouring church of Llanallgo.

Charles Dickens gave this description of the last of

the *Royal Charter*:—"A man living on the nearest hill-top overlooking the sea, being blown out of bed at about daybreak by the wind that had begun to strip his roof off, and getting upon a ladder with his nearest neighbour to construct some temporary device for keeping his house over his head, saw from the ladder's elevation, as he looked down by chance towards the shore, some dark troubled object close in with the land. And he and the other, descending to the beach, and finding the sea mercilessly beating over a great broken ship, had clambered up the stony ways like staircases without stairs, on which the wild village hangs in little clusters, as fruit hangs on boughs, and had given the alarm. And so, over the hill-slopes, and past the waterfall, and down the gullies where the canal drains off into the ocean, the scattered quarrymen and fishermen inhabiting that part of Wales had come running to the dismal sight, their clergyman among them. And as they stood in the leaden morning, stricken with pity, leaning hard against the wind, their breath and vision often failing as the sleet and spray rushed at them from the ever-foaming and dissolving mountains of sea, and as the wool which was part of the vessel's cargo blew in with the salt foam and remained upon the land when the foam melted, they saw the ship's life-boat put off from one of the heaps of wreck; and first there were three men in her, in a moment she capsized and there were but two, and again she was struck by a vast mass of water and there was but one, and again she was thrown bottom upwards, and that one, with his arm stuck through the broken planks and waving as if for help that could never reach him, went down into the deep."

Even more terrible in its circumstances than the wreck of the *Royal Charter* was the loss of the *Northfleet*. You will have realized that no help could have been sent to the *Royal Charter*; the *Northfleet*, on the other hand, sank in a crowded anchorage, and nearly every one of the 290 people who perished with her ought to have been saved. The *Northfleet* was an emigrant ship bound for Australia, with some 370 souls on board. She left London on 13th January, 1873, but owing to the violence of the weather she was obliged to lie-to at the mouth of the river. Eight days later she had only got as far as Dungeness, where, in company with many other ships, she again sought refuge from the gale, the violence of which had not abated. Here she was run into by a steamer, which, having crashed half-way through her, then made off in the darkness, cruelly abandoning the smitten *Northfleet* to her doom. Then followed one of the most frightful scenes ever enacted at sea. The panic-stricken emigrants, mostly navvies, made wild rushes for the boats, trampling down women and children and behaving like madmen. In the confusion there was, as usual, bungling at the boats. Some were not launched at all, others, by the unequal lowering of the falls, pitched out their occupants before they touched the water, and were smashed; and the two that were launched successfully were crowded by the navvies, who fought their way into them, heedless alike of the screams of the women and the threats of the captain. "The wild rush for the boats," said a survivor, "and the mad confusion that took place, was like the trampling of a herd of buffaloes. Poor Captain Knowles, brave as a hero all the time, was

nevertheless angered at the reckless selfishness of the men, and he drew a pistol and threatened the big fellows who were leaping helter-skelter into the boats."

Although the captain was as good as his word, and fired on the cowards, wounding one or two of them, they did not heed him.

Only 86 of the 379 persons who sailed from the London Docks were rescued, although the roads were crowded with sail. The rockets and flares fired on the *Northfleet* were plainly visible from shore, yet the vessels lying near seem to have been ignorant of what was happening so close to them. One large ship was actually moored within 300 yards of the *Northfleet*. But the look out, though he must have heard the cries and seen the rockets, took no steps to raise an alarm. It is thought that with timely help the loss of life would have been extremely small, for the *Northfleet* did not founder until half an hour after she was struck. The accident revealed a grave defect in the system of distress signalling, for those who saw the rockets thought they were signals for a pilot.

Very terrible were the sufferings of those on board the *Hallswell*, an East Indiaman, which, in 1786, was driven ashore on the rocky coast of the Isle of Purbeck. At the place where the ship struck the cliffs are very high, having a large opening at the base. Two hundred and fifty people were on board, amongst them several women. For half the long winter night the vessel tossed and pounded on the rocks, every large wave sweeping her from stem to stern. The women huddled together in a deck-house until that too was swept away, and then they had no shelter. Meantime some of the more venturesome among the

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Photo. Henry Dixon & Sons

ROVERS ATTACKING A GALLEON

From the painting by C. M. Padday.

crew trusted themselves to the waves, and were fortunate enough to be washed into the cavern. An hour or two before dawn they heard terrible cries from the ship, but these soon ceased, giving place to a silence more terrible still. Then the survivors knew that the *Hallswell* had broken up.

Their own position was grave enough. The angry sea washed the floor of their cavern and boiled round the entrance to it. Help could only come to them from above; but how to summon it? At last things looked so desperate that several men attempted to climb the cliff. Some gave up, and others fell and were with difficulty saved a second time from drowning; but one succeeded in reaching the top. Fortunately a light was burning in a cottage in the village of Worth, and this light guided the exhausted man to safety and help. The villagers turned out in a body, knowing full well that only by the most strenuous efforts could a number of people be hauled up the face of that horrible cliff; and they went to work deliberately.

First they drove large stakes into the ground in pairs, distant from one another by a few yards. Then they lashed a man to every stake, and while one party of men and women was told off to minister to the rescued, the rest were all ready to "tail on" to the rope. At last the rope was lowered, and one after another eighty men were safely drawn to the top, that is to say, all who had gained the shelter of the cavern. This calamity, shocking though it was, was the means of saving other lives, for as a consequence of the wreck of the *Hallswell* a life-boat was afterwards stationed near St. Alban's Head.

CHAPTER XII

Pirates and Buccaneers

The history of pirates is as old as the history of ships. Piracy offered a fairly easy livelihood to men who were bold enough and bad enough to follow it, that is, as soon as the practice of carrying portable property by sea became general. In the early days when might was right, it was rarely considered a crime for a man to capture and keep by the power of the sword anything that he wanted. What we should call robbery was then considered fair play. The weaker party at least had the chance of making a resistance and of trying to protect his property. But at the same time real pirates existed, who sailed the seas simply for the sake of plundering other vessels, and who were not influenced by patriotic or private enmity. These men would prey upon any boat they met which seemed to offer them sufficient reward. The Phœnicians and Greeks indulged largely in piracy of the better sort; that is to say, they would waylay the boat of an enemy, but would respect the property of their friends. The Phœnicians were too keen tradesmen to molest likely customers, but they were also keen enough to help themselves whenever opportunity arose. Again, our own great seamen of Elizabethan times treated the Spaniards with

scant courtesy. Nowadays we should call their doings "piratical", but at that time international law had not been formulated, and the captain of any ship was a law unto himself so long as he sailed the seas.

The most dreaded pirates of early and mediæval times were our old friends the Northmen. We have seen already how they plundered the coasts of Northern Europe, and they would attack any foreign boat that was not too big. Their ferocity made them respected and feared. They were rarely defeated in battle and had no fear of death, so that they became amongst the most powerful people of their time. To them fighting was as the breath of life. When their rulers became strong enough to suppress civil wars, the adventurous spirits had to go abroad to find the enemies which were essential to their peace of mind. When none were forthcoming, one viking ship would challenge another, just for the sake of the battle. The larger ships had no hesitation in landing at a town and sacking it, killing any of the inhabitants who tried to resist them. A special petition, "From the fury of the Northmen, O Lord, deliver us", was included in the Litany at most places on the sea-coast. Inland towns also were often attacked. The long, light boats of the vikings could sail far up rivers and penetrate into the heart of a country. In fact, till the middle of the ninth century, the vikings seem to have been sea-rovers of the most avaricious and bloodthirsty kind. After that date, however, they settled down to a more dignified way of life—conquering instead of slaughtering, and maintaining colonies. In 912 Charles the Simple of France

ceded to Rollo, or Rolf the Ganger, a piece of land on the north-west coast of France, realizing that it was quite hopeless otherwise to escape his depredations. Rollo and his followers thus became the ancestors of the Normans, who in conquest by land and sea proved themselves no unworthy children of the vikings.

In Chapter II I told you a little about the Hanseatic League, how it was formed for the protection of merchants against the extortionate demands of landowners, and the assaults of robbers and highwaymen. But these were by no means the least of the troubles which attended the paths of the unhappy merchants. Enemies came by sea as well as by land, and the League aimed at suppressing bandits of the high seas as well as those of the high roads. The Baltic swarmed with pirates. Its coasts were inhabited by seafaring peoples who took to piracy, or, as they considered it, lawful plunder, as readily as the Venetians took to trading. Yet the members of the League were by no means blameless themselves in this respect, as a glance at some of Hakluyt's records will show us. So strained did relations become between English merchants and the Hanse towns that at last Henry IV was obliged to take steps to protect his subjects. As a result an agreement was entered into between Henry and "the common societie of the Marchants of the Hans", setting forth the grievances of the English on one hand and promising redress and amendment on the other. We may quote some of the offences enumerated by Hakluyt:—

"Item, that in the yeere of our Lorde 1395 Hans van Wethemonkule, Clays Scheld, Godekin Mighel, and one called Strotbeker, by force of armes, and by

the assistance of the men of Wismer and Rostok, and others of the Hans, did upon the Sea neere unto Norway, wickedly and unjustly take from John Tutteburie, five pieces of waxe, four hundred of werke, and halfe a last of osmundes, and other goods, to the value of foure hundred seventie sixe nobles.

"Item, in the yeere of our Lorde 1398, one John van Derlowe, Wilmer, Hans van Gelder, Clays Scheld, Everade Pilgrimson, and divers others of the Hans, did upon the Sea neere unto Norway, villainously and unjustly take a shippe of John Wisedome of Hull, called the Trinitie, with divers goods and marchandizes, namely oyle, waxe, and werke, to the value of 300 pounds."

In some instances the merchants were imprisoned for ransom or "maliciously slaine". But we must not suppose that the English submitted tamely to these outrages. The agreement, as a matter of fact, contains a clause promising "a due recompense and a proportionall satisfaction, for all those persons of the land of Prussia, Livonia, and of the cities, townes, and other places of the Hans, who have unjustly bene drowned, and slaine by the English".

The history of the Hanseatic League in Russia reveals to us that its members were the shrewdest of traders and the most arbitrary of masters. The severity which they practised when they had attained power was little more humane than the demands of the robber barons had been, but they protected the interests of their own countrymen rigidly. However, these stringent rules at length led to their downfall. England wanted to trade with Russia and wanted to do it profitably. To this end was the expedition

dispatched by the advice of Sebastian Cabot, to which I alluded in Chapter VII, with an entirely successful result. The Hanse in Russia declined and died, while from other causes its power in other countries dwindled.

We cannot claim immunity as a nation from the sin which beset all seafaring peoples at that time. Why, indeed, should we try? If the Spaniards helped themselves to our property let us by all means help ourselves to theirs. In extreme cases our captains were granted letters of reprisal by the sovereign, but a great deal of unofficial "reprising" was done, which succeeded well enough so long as it was successful. When it failed, disgrace and death were the natural sequence. Hear the story of John Oxenham, as brave a man as ever sailed the seas, who nevertheless suffered the extreme penalty for his boldness.

John Oxenham, hearing of the wonderful prizes Drake had taken in that part of America which we call Panama, made the voyage there in a little ship of 120 tons, with a crew of seventy, intending to win something for himself. He ran his boat ashore at the point where Drake had landed, and then he and his men covered it all up with boughs of trees, and taking with them a good stock of provisions and firearms, they set off inland. Here they found some of the negroes who had been friendly with Drake, and who were, in fact, escaped slaves. These men led Oxenham to a river where they camped for a time. Here they built a ship on which they sailed down the river to the Pacific. They steered a course for the "Iland of Pearles", and before many days had passed attacked and captured one vessel carrying

60,000 pezos of gold, and another carrying 100,000 pezos of silver. These vessels Oxenham sent away, while he himself, with the treasure, went back up the river.

But meanwhile the inhabitants of Pearl Island had sent word to the Governor of the capture of the treasure ships; and a small fleet of boats and a hundred soldiers were sent in pursuit of Oxenham, under the command of Juan de Ortega. He first fell in with the ransacked treasure ships, who told him which way the English had gone, and presently as he sailed up the river he found Oxenham's boat lying on the shore, defended by only six men. The Spaniards then determined to seek Oxenham and the booty on land. Oxenham had hidden the treasure in a little house made of boughs, while he made arrangements to transport it to the Atlantic coast, where his ship still lay. His own men, however, demanded a larger share than he was prepared to give them, and he was still negotiating with the negroes when Ortega found the hiding-pl ce. The Spaniards, having got the gold and silver, would not have troubled any more about Oxenham, had not he and his party, reinforced with some two hundred negroes, attacked them furiously. The battle was short and decisive. Eleven of the English were killed and five taken prisoners; the rest got away safely. The Spaniards took possession of all their tools and belongings. The Governor then sent to the Bay of Darien and appropriated the ship which Oxenham had left hidden beneath boughs. Thus the unfortunate party was left destitute and penniless and without any means of building another ship to get home in. For some time Oxenham subsisted in

the mountains, but sickness had broken out amongst his men and he was quite disheartened.

Before very long the matter came to the ears of the Viceroy of Peru, who at once sent a band of soldiers in pursuit of the English. Even then Oxenham did not give up the struggle, but fled farther into the mountains, hoping to elude the soldiers altogether. No doubt he would have done so had not the negroes betrayed him. The entire expedition, or what was left of them, were taken prisoners and marched to Panama. Here a form of trial was gone through, though there could have been no doubt in Oxenham's mind as to what his end would be. The justice asked him if he had any licence from the Queen or any powerful noble, but he was obliged to answer that he had not, but that he had come of his "owne proper notion". It is not likely that he had any great desire to live now that all his hope was crushed. His followers were all executed at Panama. He himself, with the sailing-master and pilot, was taken to Lima and executed there. Of the brave seventy who had sailed so gaily from England, only five boys survived. What happened to them ultimately we do not know.

Oxenham and his kind were, according to our ideas, simply privateers. The buccaneers, however, were a different class which originated in a different way, and were much more nearly allied to the bloodthirsty pirate of fiction than the Oxenham breed. We do not read of the privateers killing for killing's sake, or torturing their prisoners unduly. They were out to make money, but the gold-lust was not allied in them to the fever-lust. The privateer expeditions, moreover, were generally under the leadership of a man of

some standing if not of culture, who would do his utmost to keep his men in hand and to restrain their baser instincts.

But the buccaneers were a class apart. They were mostly white men who had been enslaved by the Spaniards to work in the sugar plantations. Naturally they escaped whenever they could, but even if they had not the good fortune to get away the time of slavery for a white man was comparatively short. In either case a term of enslavement to a Spanish master did not bring out a man's best characteristics. The Mecca of a white slave was the logwood forests on the coasts of central and southern America. In course of years there congregated in these forests a crowd of hard, desperate men, who cared for nothing in heaven or on earth. The degrading lives they had led, and the savage lives they were now leading, made them far more bestial than human. Any man who could use an axe was sure of a living, if not actual wealth, in the logwood trade, but most of them indulged in a side-line which was even more profitable. This was the making of "boucan", which was the dried flesh of the cattle which roamed about the plains. The cattle were the property of the Spaniards, but as they allowed them to stray untended they could not have been surprised when the logwood cutters helped themselves. Occasionally the Spaniards would take revenge by attacking a camp of logwood cutters, or boucaniers, as those who prosecuted the boucan industry were called. If the attack were successful, the Spaniards would carry off the boucaniers and introduce them to the horrors of the Inquisition. Sometimes a wretched survivor would crawl back to his

friends in the forest, and we may believe that there the story of the buccaneers, as it affected the rest of the world, began. Men as hardy and fearless as they would not bear the tyranny and brutality of the Spaniards without an attempt at least to "get some of their own back". The attempt was successful. Pierre le Grande, the first buccaneer leader whose name has come down to us, lay in wait off Cape Tiburon, with twenty-eight men, for the fleet of Spanish treasure ships, which two or three times a year sailed for home laden with "pieces of eight" and bars of gold and silver. Directly the first boat came within reach the buccaneers rowed quickly up to her, scuttled their boat, boarded the vessel and took possession of her. So sudden and so furious was their attack that the Spaniards had no time to beat them off. Following on this great victory came others equally notable, until the boucaniers proper became buccaneers, and the gentle industries of boucan-making and logwood cutting were left to the tame and weakly spirits.

We cannot deny that the buccaneers attained a power which was felt by all the rest of the civilized world. By their hatred of Spain and all things Spanish they hastened the downfall of that already decadent country. Millions of pounds of Spanish money must have found their way into the pockets of the buccaneers, most of whom were of either French or English blood. The earlier years of their history show that they were not entirely without law and order. Towards one another and towards their friends they were faithful and generous; they had a certain amount of discipline and self-control, and were un-

deniably fine fighters. But they were savagely cruel to their enemies—that is to say, the Spaniards—and were greedy and grasping. Nevertheless they had a large share in West Indian conquest. They captured and held the Isthmus of Panama, the connecting link between the Pacific and the Atlantic, so that the Spaniards were forced to drop their habit of sending slave trains loaded with treasure from one coast to the other. Henry Morgan, who was knighted by Charles II, was made deputy-governor of Jamaica, which his companions had captured. He was a man of extraordinary daring and extraordinary organizing ability, and from being an ideal buccaneer he became an ideal governor.

Of a different type was William Dampier, who, though a great mariner, was a bad man and a harsh master. We have cause to thank him for leaving us an account of his voyages — he went four times round the world—and for his *Discourse on the Winds*, and for still another reason which I shall tell you presently. Quite at the end of the seventeenth century he was sent by the Government to conduct a voyage of discovery in the South Seas, in the course of which he explored the north-west and west coasts of Australia. But though he was an excellent pilot he was a disgraceful commander, and on his return home he was court-martialled for cruelty. Next we hear of him taking two vessels to the South Seas on a second voyage of exploration. This is the one that chiefly interests us; for the master of the second ship was marooned at Juan Fernandez and not relieved until 1709, when Dampier acted as pilot to a ship which went to fetch him. Why is that interesting?

Because the man was Alexander Selkirk, and if you do not know all there is to know about him, go to your bookshelf and take down *Robinson Crusoe.*

Those who want blood-curdling stories of piracy, mingled with a great deal of accurate and interesting information relating to the West Indies, and a certain amount that is quite unreliable, cannot do better than read John Esquemeling's *Buccaneers of America.* Esquemeling was a Frenchman, who, by a combination of adverse circumstances, found himself a prisoner in the hands of the Spaniards. He was so badly treated and badly fed that he became very ill, and the Spaniards sold him for a small sum to a surgeon. His new master was as kind as the old ones had been brutal, and, after nursing him back to health and strength, gave him his liberty on the understanding that, when he could, Esquemeling should repay him some part of the money with which he had been bought from the Spaniards. This Esquemeling joyfully agreed to do, but when he came to think matters over he realized that he had little hope of fulfilling his promise, being, as he says, much in the same condition as Adam. In order to improve his worldly position he joined himself to a band of buccaneers, in the hope of winning in time enough to pay his debt to the surgeon and to put himself into some honourable way of life.

The exploits of a creature named L'Ollonais are told with much detail by Esquemeling, and would furnish material for many a "penny dreadful" or "shilling shocker". L'Ollonais seems to have been devoid of all human sentiments save greed. For a long time he had plundered Spanish ships and pillaged and burned the towns. Many attempts had been made to

capture him, but he always got away, with the amazing luck which sometimes follows scoundrels for a space. At length the Spaniards decided that they could bear his outrages no longer, and the Governor of Havana sent a ship in search of him, with strict orders to the captain that he "should not return unto his presence without having totally destroyed those pirates". For this purpose he gave the captain a negro who was to act as hangman, and the pirates were to be executed on the spot where they were taken; but L'Ollonais himself was to be brought back to Havana. L'Ollonais soon heard of the dispatch of this punitive force, but instead of fleeing he turned back to meet it. In the dusk his boat came into the river where the Spaniard lay, and the watch hailed him to know who he was and whether he had seen any pirates. But he replied No, that he had not seen any pirates. When the day broke L'Ollonais and his men boarded the Spanish ship and took charge of it before the soldiers were awake, so that they were obliged to surrender. And he had them all brought up on deck, and as they came, one by one, he had them executed. He spared only one man, whom he sent back to the governor with a message that so would he treat in future every Spaniard who fell into his hands. If he had stopped at mere hanging we should not feel such a deep disgust and loathing of L'Ollonais, but he did not. In one place Esquemeling says: "L'Ollonais, who never used to make any great account of murdering, though in cold blood, ten or twelve Spaniards, drew his cutlass and hacked one to pieces in the presence of them all." In other places he tells us things more terrible

still. We have, however, the deep satisfaction of knowing that L'Ollonais himself came to a horrible end. Retribution overtook him at last in the shape of a band of Indians, who tore him limb from limb, and threw him, "still alive", according to Esquemeling, upon a fire.

For various reasons, the glorious days of buccaneering came to an end when the seventeenth century did. William III, in 1700, passed laws which provided some means of dealing with these slippery persons, and he enforced his arrangements by sending warships to the West Indies. But the buccaneers themselves had changed. They were no longer of the hearty, good-fellow type, who would stand by a friend till death. Instead, their numbers had been reinforced by cut-throats and desperadoes from all over the world, each of whom wanted to make his own fortune. Thus they were the more easily attacked since they were controlled by no bond of unity. Moreover, the war between England and France broke up the alliance between English and French buccaneers.

The scene now changes to the north coast of Africa, where, since the fourteenth century, a race of the most dastardly pirates the world has ever seen had been maturing and gaining strength.

As did the buccaneers, the Barbary pirates originated as a result of political and religious differences with Spain. In 1492 the Christian rulers of Spain finally threw off the yoke of the Moors and drove them into exile. The Moors, too much crippled to regain their supremacy, nevertheless caused the Spaniards very great distress by attacking their

coasts, burning and plundering wherever they went. At this stage the Moors considered themselves as conductors of a holy war, and their exploits needed no justification in their own eyes. The degeneration of their operations into sheer butchery and pillage may be traced to the shameful influence of two Moslems from the Levant—Arouj and Khair-ed-Din, surnamed Barbarossa—who, having got into trouble with the Turks, joined themselves to the Barbary pirates. The Barbarossas, particularly Arouj, for Khair-ed-Din was early killed in battle, were deservedly dreaded as the most desperate of the corsairs. Yet their power was indisputable, and so it happened that, when the Spaniards attacked Algiers and Cherchel, the rulers of those towns sent to Barbarossa for help. Arouj came with a large following and beat off the Spaniards; but, not content with that, he murdered the luckless princes who had asked for his help, and seized Cherchel and Algiers for himself. On another occasion the Prince of Tlemçen, being hard pressed, called upon Arouj to assist him, but Arouj pursued just the same course. He saved Tlemçen, but murdered the prince.

The story of the corsairs from 1587 to 1830 is one long record of bloodshed and treachery, and, to the shame of all the European Powers, only half-hearted attempts were made to suppress them. Their cruisers were built as investments by Algerian capitalists, and were commanded by captains called Reises. Graceless adventurers from all countries joined the ranks of the corsairs, and assisted in the abominable slave trade which enriched them. The pasha of the town to which the cruiser belonged received ten per cent of

all the takings, the owner of the cruiser a large share, and the reise and the crew divided the rest. Bougie was the centre of the cruiser-building industry, the timber being obtained from the country behind the town. A great impetus was given to the business by a Fleming, Simon Danser, who joined the corsairs some time in the seventeenth century, and taught them how to build sailing ships. This very much increased their capabilities, and enabled them to travel far away on the Atlantic Ocean, even as far as Iceland. In 1631 Murad Reis, who was also a Flemish subject, sailed to Baltimore in Ireland. He completely sacked the town, and carried away a large number of captives, who were taken to Algiers, and there exposed for sale in the slave market. The French historian, Pierre Dan, mentions seeing them there. In fact, during the first half of the seventeenth century the corsairs were a terror to the whole of maritime Europe. Although some countries paid them large sums for peace, that did not ensure their safety, for the simple reason that the corsairs thought nothing of breaking their promises.

They were rich and merciless, and no one dared withstand them; but it is dreadful to have to relate that the so-called Christian nations used to encourage the pirates against their enemies. Even in the eighteenth century British business men used openly to say that the corsairs were useful in keeping down competitive traders. At one time there were 20,000 captives in Algiers. Certain religious orders, such as the Lazarites and the Redemptionists, were founded with the express purpose of working for the release of captives, and it was a common thing for

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LOOT

From the painting by C. M. Padday.

wealthy people to bequeath large sums of money for the same end. But such efforts were of little avail when France was subsidizing the pirates to attack Spain, and Great Britain and Holland combined to encourage them against France. It was not until Great Britain acquired Malta and the Ionian Isles that she took any energetic steps towards exterminating the pirates. The Congress of Vienna called upon Great Britain to act for the whole of Europe, and in 1816 Lord Exmouth was sent to Algiers to extract promises of amendment and reparation. The promises, of course, were given glibly enough—nothing easier; but at that very time the Algerians were cruelly torturing a number of British residents at Bona. Exmouth sailed home knowing nothing of this, but the news reached England before he did, and immediately upon his arrival he was sent back again to take vengeance. With the help of a fleet of Dutch war-ships, under Admiral Van de Capellen, he bombarded Algiers with terrific fury, and so impressed the inhabitants that they led out three thousand of their prisoners and handed them over to Exmouth. But it was not until the French acquired Algeria in 1830 that the death-knell of the corsairs sounded.

For a very long time the Turks regarded as fair prey every English ship they could catch. We read of Queen Elizabeth, "the proudest woman in Europe", begging and entreating the Sultan to release her subjects who were detained in the galleys.

The story of John Fox, who was taken by the Turks, is not so well known as it ought to be, and I shall repeat it here for the benefit of those who have

not heard it before. Fox was a gunner on board the *Three Half Moons*, which sailed from Portsmouth for Seville in 1563, with thirty-eight men. When they were within a short distance of the Straits of Gibraltar they were met by eight Turkish galleys which came up with them very quickly, leaving no doubt as to their intentions. Led by the master, the owner, and the purser the English made a most desperate resistance. The Turks boarded the vessel, where they were given a terribly hot reception. The English fought hand-to-hand with their halberts and brown bills, mowing down the Turks like so many saplings; but in spite of their bull-dog courage, and in spite of the surpassing ferocity of the boatswain, whose conduct was likened to that of a mad lion, the English were overcome.

The Turks, however, had no respect for the gallant defence made by their prisoners. Their clothes were stripped off and they were set to work at the oars, under the pitiless encouragement of the whip. Before very long the master and the owner were ransomed by their friends at home, but the others found no release but in death. Fox was a man of iron constitution and splendid courage. He did not die, although he had the miserable knowledge that he was the only one left alive of all those who had been taken from the *Three Half Moons*. His saving circumstance was the fact that he was an excellent barber, and by practising this trade he had been able to earn a little money. Thus he was enabled to buy himself better food than the other prisoners had, and also by bribing the jailer he obtained permission to go in and out of the prison, though with irons on

his legs. Six other prisoners also had this privilege, and after fourteen years Fox, with their help and that of one Peter Unticaro, formed a plan of escape.

Unticaro was a Spaniard who, having been an exemplary prisoner for thirty years, was practically a free man, so long as he paid his jailer for his indulgence. He was allowed to keep a little public-house, to which Fox and his six companions used to go. After some time their plans were all laid. At the end of December, 1576, when the galleys were drawn up for the winter and the captains and crews were away on furlough, there were 270 prisoners in the jail at Alexandria, only three of whom were English. On the appointed night Fox and his friends took the irons off their legs with files procured by Unticaro, and went to Unticaro's house, where they appeared to get very drunk. Presently Unticaro went out, and, according to the plan, asked the governor of the prison to come down to his house, where a certain influential man was waiting to see him. The governor at once complied, but he had no sooner arrived at the inn than he was struck down dead by Fox, who had armed himself with a rusty sword. The eight conspirators then marched up to the prison, which had been left unlocked for the return of the governor. There were six warders, who promptly challenged the intruders.

"All friends," answered Fox, and immediately they fell upon the warders and killed them all. Then they shut the gate and fastened it firmly on the inside. They made their way into the house of the dead governor and took possession of the keys of the

fortress, Unticaro and two others also helping themselves from a chest of ducats. Then a series of fearful experiences ensued. Fox opened the prison doors and set the captives to work. Most fortunately a beautiful galley lay near the prison. This had to be equipped with sails and oars, and provisioned. Others were told off to barricade the gates against possible attacks from the Alexandrians. In the meantime Fox and his friends had come face to face with eight Turks, and had chased them through the prison until at last they were driven to bay upon the roof. There the little band followed them, and a fierce battle took place, in the course of which Unticaro, and the two others who had unwisely overburdened themselves with gold, were killed. Only one Turk escaped death, and he, falling wounded over the side of the roof, by his cries roused the neighbours and told them that the Christians had broken loose. In an instant Alexandria was in an uproar. Soldiers attacked the prison doors on the land side, while others manned the guns in the two great forts which covered the entrance to the harbour. But the Christians were not to be beaten. Their galley was afloat, they had a fair wind, and they were off and away from the land of their slavery. The crucial moment was still to come, when they had to run past the terrible forts, but it came—and passed. Of all the forty-eight shots fired at the vessel in those moments of agony, not one took effect. Call it luck if you will; I prefer to call it Providence. So did John Fox, and, the danger passed, the band of Christians knelt to give thanks for their deliverance. Then with what a will they bent to the oars, and how

sweet seemed the task that to many and many of them had been the uttermost torture!

A story full of incident is told by Henry Kingsley in his *Tales of Old Travel*. It concerns the wrecking in 1629 of the *Batavia*, which, having been nine months upon the sea, went to pieces on a reef on the east coast of Australia. There were some islands within reach, so the captain, Francis Pelsart, determined to put ashore the women and children and sick men, and afterwards to make some plan for repairing the vessel. Unfortunately the *Batavia* broke up before anything could be done for her; the islands proved sandy and destitute of water, and the crew got drunk and failed to bring to land a great many of the barrels of water from the ship. However, nearly everyone was landed in safety—forty people on one island with about 40 gallons of water, and a hundred and twenty on the other with a smaller quantity of water. The captain and the crew still clung to the *Batavia*, but on the fifth day after the wreck, with the consent of the whole party they set off in the ship's boats to search for water. This was by no means an easy task. They were in a part of the world "where no man had ever been before", navigation was largely conducted by guesswork and good luck, and the nearest civilized land was Java, 1500 miles away. However, Pelsart departed, leaving his hundred and sixty passengers on the two islands to take care of one another. How they fared I will tell partly in the words of Henry Kingsley:

"Jerom Cornelis was about the last man who succeeded in getting from the wreck; in fact, he spent ten days on her before he got to land on one of the

yards. In the absence of Captain Pelsart he had to take the command.

"He now suddenly came out in his true colours, as one of the most treacherous and bloodthirsty ruffians one reads of in the history of piracy. He determined to surprise the captain when he returned, and with a few faithful followers to turn pirate. For this purpose it became necessary to butcher all the honest men of the party, which were, we may suppose, a very large majority.

"His first action was to separate the honest men, and take them in detail. For this purpose he dispatched Mr. Weybhays and the chaplain with forty men to another island to look for water. Weybhays found water and made the signal agreed on; he lit three fires, but they were unnoticed, for the massacre on the larger island had begun.

"Between thirty and forty were killed on the occasion, and his fiendish plan had so far prospered; only a few poor fellows had cast themselves into the sea and gained Weybhays, with their horrid tale of treachery and murder. . . ."

Cornelis next attacked the party of forty on the smaller island and killed every one. Thus he only had to fear Weybhays and his companions, but for the time being they were *hors de combat*, and Cornelis and his followers employed the interim in an outbreak of villainous absurdity. Cornelis styled himself captain-general and drew up a code of laws. He broke open the chests of merchandise which had been saved from the wreck and dressed himself and his "guards" in costumes of gorgeous brocades and cloths, heavily ornamented with gold and silver lace. But business

had to be attended to. Accordingly, when his passion for "dressing up" had worn itself out, he sent twenty-two men to destroy Weybhays and his friends. Fortunately the attack failed, as did a second attempt of thirty-seven men. There was nothing left for Cornelis but treachery, since he did not choose to have any witnesses of his butchery alive when Pelsart should return.

Accordingly, Cornelis began to send apologies and fair words to Weybhays, and at the same time he entered into secret communication with some French soldiers of Weybhays's party, hoping to bribe them to betray him. Kingsley describes the result thus:

"I suppose French soldiers have always been the same. I suppose that on the receipt of these letters, they compared them one with another, put their legs very wide apart, and began walking up and down in front of one another, looking savage and twitching their heads; and that at last one of them said sharply '*Non*', at the back of his nose; and that all the others said '*Non*', also, each looking at the other, as if the insult had come from his comrade, and he was prepared to fight him, or his own brother, and on the slightest notice.

"However, this is imaginary; the fact is, that these noble Frenchmen carried their letters to Weybhays, and laid them before him.

"When Jerom Cornelis came the next morning, Weybhays was perfectly ready for him. Cornelis came across with the clothes he had promised Weybhays, followed by only three or four men. Weybhays attacked them, killed three or four, but, better than this, captured Cornelis in his tom-fool's dress, and bound him tight."

The fellow-conspirators of Cornelis, finding their captain seized, made a desperate attempt to rescue him, but they were utterly beaten by Weybhays, and forced to return disconsolate to their island. And then the worst, for them, happened. A Dutch man-of-war appeared in the offing, and Pelsart was on board. The mutineers—I suppose on the principle that one might as well be hanged for a sheep as a lamb—had the hardihood to row up to the frigate and demand the immediate surrender of Pelsart. We can imagine the dignified commander gazing down at the boat-load of wretched men dressed up in scarlet and purple, with tags and patches of gold and silver lace. His answer was brief, but to the point. Either they threw their arms overboard and surrendered, or he would sink them without further ado. Needless to say, they gave in, and were all put in irons as they clambered on board.

The rest of the story is soon told. Cornelis and his cut-throat followers were formally tried and hanged on the spot. Pelsart collected as much as he could of the merchandise which he had saved from the wreck, and then the frigate sailed away, leaving the islands in the solitude in which they had found them.

But the haunting memories cling to them still.

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